PURDUE UNIVERSITY

Technical Institutes

1946—1947

CATALOG

Divison of Technical Extension

PURDUE UNIVERSITY

Division of Technical Extension

Purdue's Technical Program
Serves
The People and the Industry
of the State

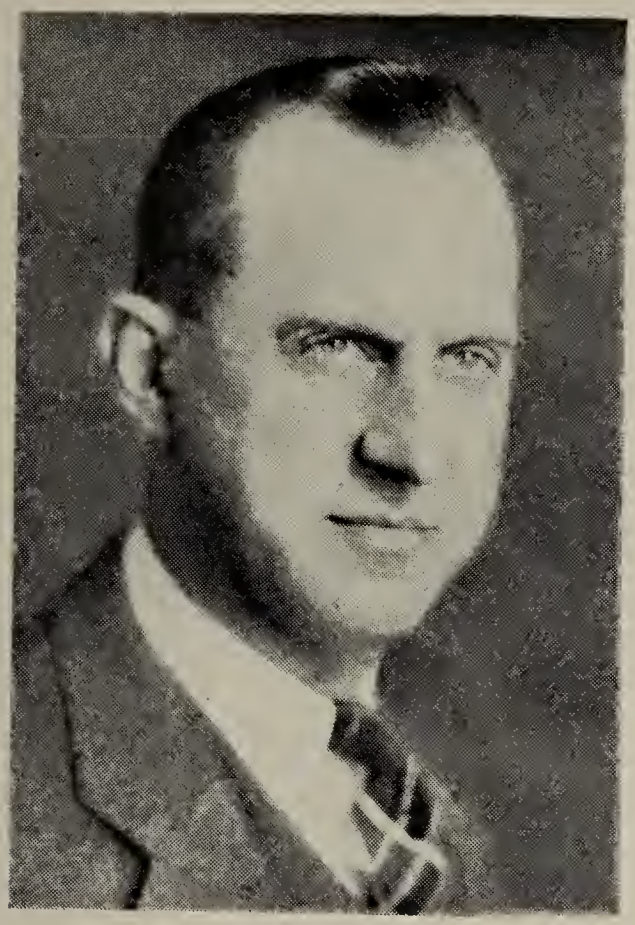
If you can not come to the University, Purdue will serve you through its Division of Technical Extension in so far as facilities permit.

Regional offices have been established in four areas in order better to serve the people living in those communities and nearby cities. However, classes will be offered in any community where there is a need for the training of the type which Purdue offers.

For information not given in this catalog, contact any of the Regional Offices listed on the back cover or write to

Purdue University
Divison of Technical Extension
Lafayette, Indiana

Purdue District Managers



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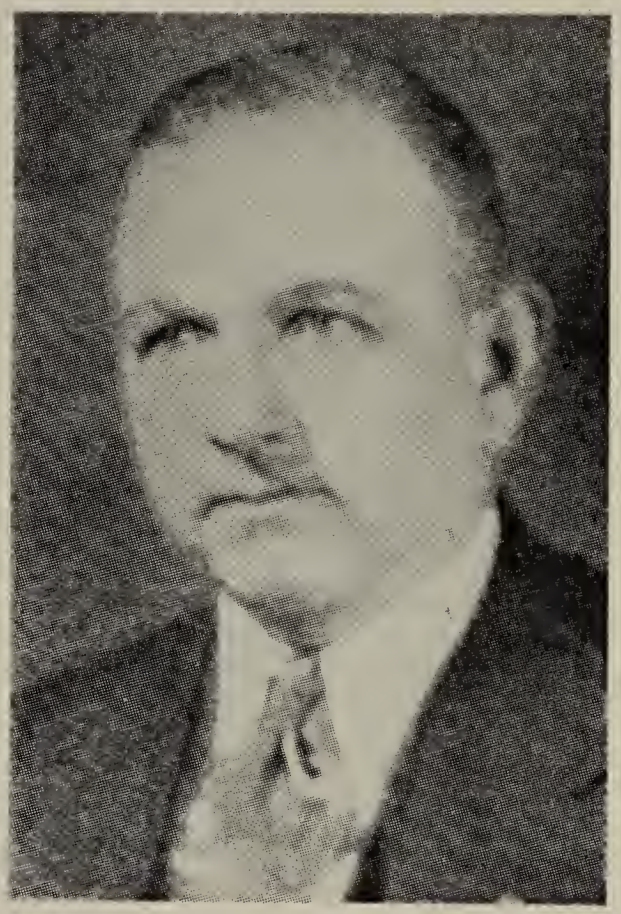

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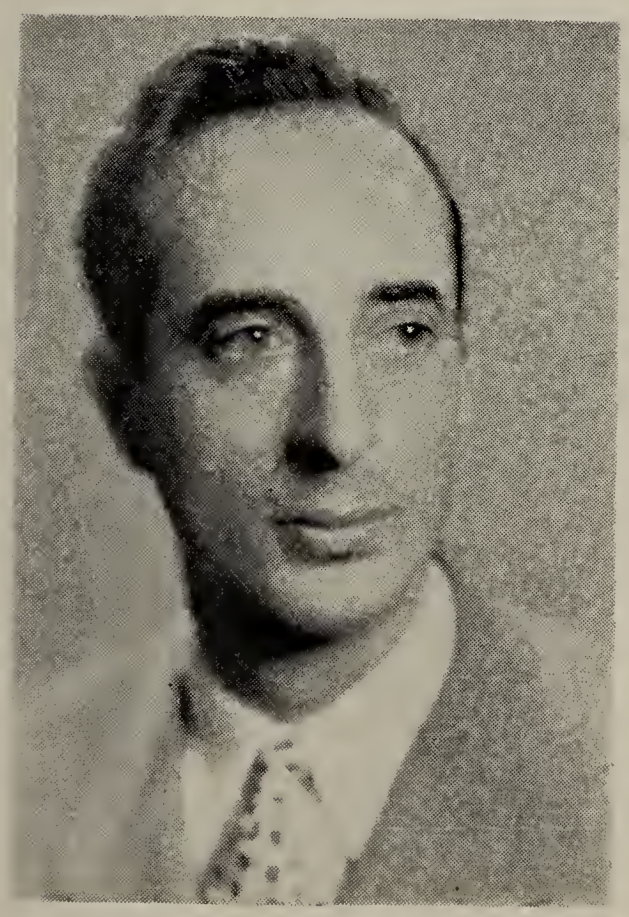

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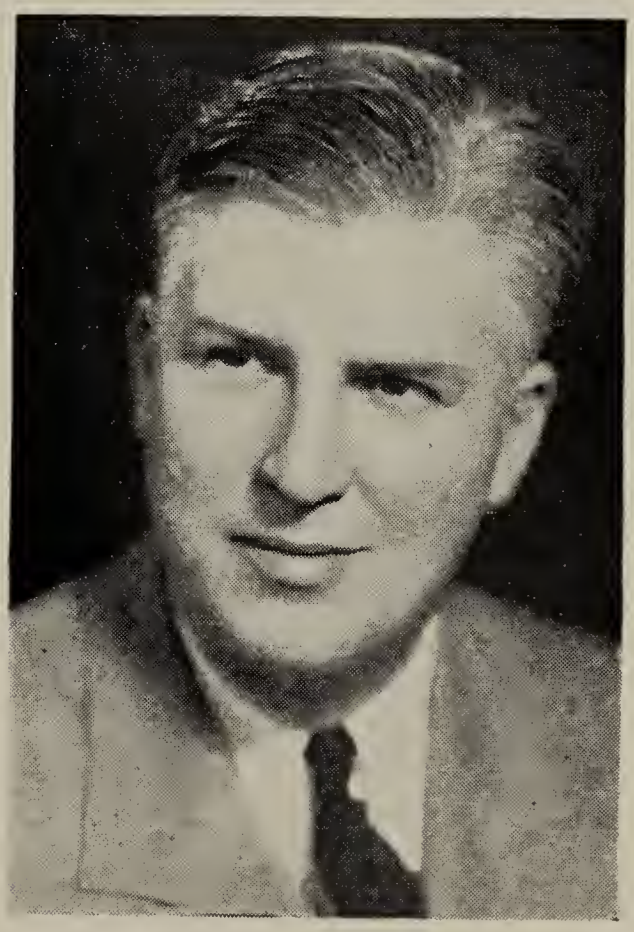

CONWELL J. POLING
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Laboratory Work

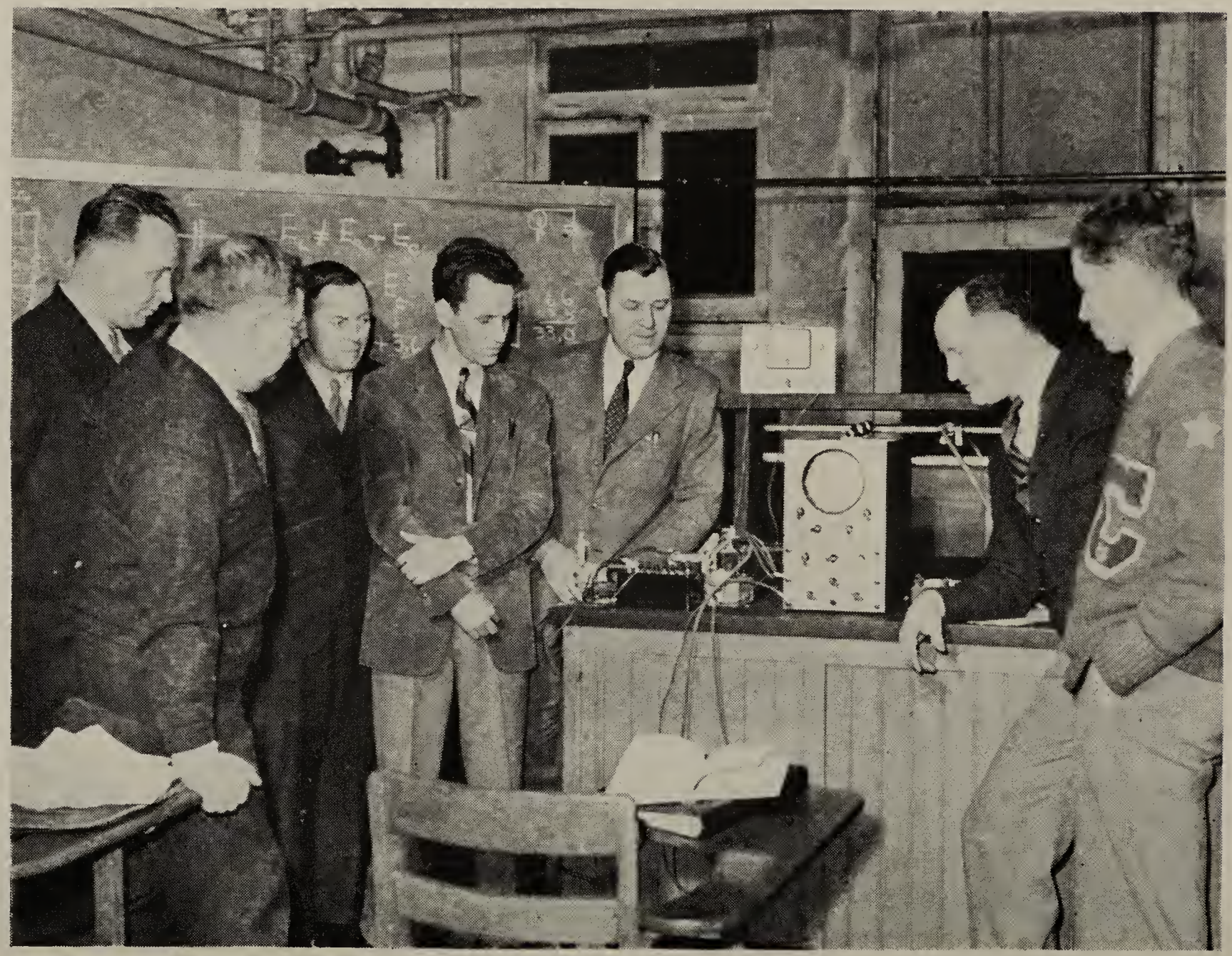
Accompanies

Classroom Discussion

in the

Technical Institute

Program.



PURDUE UNIVERSITY
Division of Technical Institutes

General Information

PURDUE UNIVERSITY is a state institution of higher learning, established by act of the General Assembly of Indiana, in 1869, under the provisions of the Morrill Act, which provided aid to the several states for the establishment of land-grant colleges, "without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanical arts." For more than three-quarters of a century, Purdue has served the needs of the people of the state in the fields of agriculture, science, and technology.

Within recent years it has become apparent that there is an increasing need for trained personnel to supplement the work of the professional engineer. In order to meet this need the Division of Technical Institutes has been established as a part of the permanent plan of Purdue University.

The Division offers specialized, intensive courses designed to meet the demand for technically trained persons. The curricula parallel and are closely related to the engineering curricula of the University. However, they differ from the engineering-college type of curricula in that they emphasize applied and practical, rather than basic or theoretical, study.

The facilities of the Division are available to those wishing to qualify as engineering aides and technicians, such as laboratory supervisors, inspectors, junior draftsmen and designers, laboratory technicians, control-instrument experts, specialists in electrical circuits and machinery, and persons charged with technological responsibilities and skills. The Division is open to all who can qualify for admission.

Various courses are offered to cover the basic knowledge and practices of present-day industry. Industrial leaders have been consulted to learn the kind of specific technical information required by persons who take jobs in industry. Many members of the instructional staff are drawn from local industries; but course administration, teaching material, and standards of instruction are under the direction of Purdue University. All student grade records are deposited with the University Registrar and all financial matters are handled through the same procedures as govern other University business.

Three terms of class work, each twelve weeks in length, are offered during each school year. A summer term is available in some instances.

Through the Division of Technical Institutes, Purdue University awards distinguishing certificates, which indicate the amount of training successfully completed by the holder.

Fields of Study and Diplomas

The Division of Technical Institutes was established primarily to offer complete programs of study in technical fields leading to Associate Technical Aide and Technical Aide diplomas.

Fundamental technical training for industry is offered through a program of study named: I. Basic Industrial Technology. This program, which has been designed to meet the need of technological workers for a broad, general background of fundamentals and a basic knowledge of industry, is available in most of the University Centers in which the Technical Institute operates. In the larger centers a higher degree of specialization can be carried on through more specialized programs of study.

Altogether, six curricula have been prepared. Any or all of these can be offered in any center where the enrollment, building facilities, and industrial need for graduates justify an expanded operation. The six programs are identified as follows:

I. Basic Industrial Technology.
II. Drafting and Mechanical Technology.
III. Electrical Technology.
IV. Supervision and Production Technology.
V. Chemical and Metallurgical Technology.
VI. Building Construction Technology.

The courses of study are outlined in detail in the section on Programs of Study (pages 5 to 23). The program in Building Construction Technology is in preparation, and more detailed information concerning it will be available in a separate announcement.

All courses in the Division of Technical Institutes are evaluated on a credit-point basis. One credit-point is offered for one hour of classroom or for one and one-half hours of laboratory or drafting-room work each week for the twelve-week term. The number of credit-points allowed and the number of hours of class meetings each week accompany the description of courses given in this catalog. These credit-points apply only to Technical Institute diplomas and are not transferable to Purdue University programs of study leading to engineering degrees. In certain cases, however, the work may be considered preparatory for establishing such degree credit upon the basis of examinations.

The Division of Technical Institutes awards two diplomas for successful completion of the required courses of study.* The Associate Technical Aide diploma is awarded to each student who satisfactorily completes 96 credit-points in one of the six programs of study. If a student wishes to take additional work in his chosen field, he will be awarded the Technical Aide diploma for the successful completion of 48 additional credit-points of work in an approved plan of study.

Requirements for Admission

Each student wishing to be admitted to the Division of Technical Institutes must submit a formal application for admission. Such form may be obtained from the Office of Admissions, Purdue University, Lafayette, Indiana, or from the office of any Extension Center. All applicants admitted must fulfill one of the following requirements:

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* Students admitted to the Division of Technical Institutes before July 1, 1945, may qualify for a Junior Technical Aide certificate upon the completion of 48 credit-points of work if they so desire. The Junior Technical Aide certificate has been discontinued in the present programs of study.

(1) Graduation from an accredited high school.

(2) Satisfactory completion of 14 units of high-school work plus the recommendation of the principal of the high school last attended.

NOTE: Those who can not formally meet the above requirements but who feel that they are qualified are nevertheless requested to submit an application. Students who lack certain essential, prerequisite, high-school courses may be advised to complete such courses under the direction of the secondary schools.

It is the intention of the Division of Technical Institutes to render a training service to those who can profit by the training. The requirements for admission are forms of evidence of that ability. Those not high-school graduates who seem to lack the ability to profit by further training at the level established may be denied permission to register.

Some students may wish to be admitted to the Division of Technical Institutes with advanced standing. Arrangements are made to credit such students for certain courses either after evaluation of a transcript from an approved institution, or after an examination. Examinations for advanced standing are available to students upon recommendation of the counselor. Students so recommended should make requests for such examinations at the office of any Extension Center. A student who passes an advanced-standing examination qualifies for credit-points in the course.

Classification of Students

Students following an approved plan of study leading to a diploma are classified as regular students. The student's plan of study for each term should be approved by a counselor at the time of registration. No minimum length of time is prescribed for students to complete their work toward a diploma. The credit-points of each student are permanently recorded at Purdue University; these credit-points are cumulative toward a diploma, regardless of whether the student is continuously enrolled in successive terms, or whether all the work is taken at any one center.

The classification of special student permits those students not working toward a diploma to enroll in any course offered, provided they can meet the stated prerequisites. A number of courses described in this catalog are not included in any program of study, and are offered primarily to meet the needs of special students.

Tuition and Fees

Tuition. Tuition, fees, and deposits for each course are listed with the course descriptions in this catalog. They are paid to a representative of the University at the time of registration.

Deferred Payments. Students have the privilege of paying their fees on the deferred-payment plan, for which an additional fee of one dollar is assessed. Students electing the deferred-payment plan must pay not less than sixty per cent of the tuition and one hundred per cent of all other charges as an initial payment at the time of registration, the balance to be fully paid within four weeks after the opening date of the term for which the student is registering.

Diploma Fee. Students in the Division of Technical Institutes must pay a diploma fee of five dollars not less than thirty days before the close of the term in which they expect to complete their work for a diploma.*

Examination for Advanced Standing. A fee of one dollar per credit-point is charged for Technical Institute examinations for advanced standing.

Refunds and Withdrawals. Full refund will be made to students refused admission to Technical Institute classes and to those withdrawing before the opening of a term. To those withdrawing within two weeks after the opening of a term, eighty per cent of the total tuition will be refunded, from which refund any unpaid balance will be deducted. In a similar manner a refund of sixty per cent will be made to students withdrawing during the second two weeks of the term; and forty per cent to students withdrawing during the third two-week period. Deposits on equipment (less possible service charges) will be refunded when such equipment is returned in good condition. Refunds are not transferable from one student to another, or from one registration period to another. Refunds must be applied for within one year of withdrawal. To withdraw, a student must notify the office where he registered of his intention to withdraw.

Attendance Requirements

In order to receive a passing grade in any course, students must attend class during eighty per cent of the scheduled class hours (including eighty per cent of the last quarter of the course) in addition to maintaining satisfactory standards of classroom performance.

Absences of not more than twenty per cent of the course work may be made up by satisfactory completion of special assignments covering the work missed, to be performed either in or outside the classroom. These will include examinations, problems, projects, etc.

Grading System

The following grades are used by the Division of Technical Institutes:

A	Superior.
B	Good.
C	Passing.
F	Failure.
Inc.	Incomplete. Temporarily assigned to students who, for some unavoidable cause, must discontinue class attendance after having satisfactorily completed eighty per cent of the course. Incomplete grades not removed as scheduled revert to F.
With.	Withdrawn. Assigned to students who discontinue class attendance while doing satisfactory work but before eighty per cent of the course is completed. Students who discontinue class attendance without approval will receive a grade of F.

* Students who were admitted before July 1, 1945, and who paid a matriculation fee, will be excused from payment of the diploma fee for the Junior Technical Aide Diploma.

Programs of Study

Associate Technical Aide. Six programs of study have been prepared for students who wish to gain the Associate Technical Aide diploma. The first of these, Basic Industrial Technology, is designed for students who plan to work in the production field in large industries. It is the broadest program offered and is made available in most centers where the Division of Technical Institutes operates. The other five programs are more specific and will be offered in those centers where the need, the facilities, and the enrollment warrant such expansion. The six fields in which programs are available follow:

I. Basic Industrial Technology.
II. Drafting and Mechanical Technology.
III. Electrical Technology.
IV. Supervision and Production Technology.
V. Chemical and Metallurgical Technology.
VI. Building Construction Technology.

Flow charts for the first five programs showing the course-by-course sequence, together with tabular listings of courses term-by-term, are given on the following pages. The purpose of these is to guide the students in making their own plans. The sixth program, Building Construction Technology, will be ready for students in the fall of 1946.

Though the number of courses in each program is not identical, the credit-points allowed for each total 96. In all these programs the same general organization has been followed. Each is composed of:

A. *Fundamental Courses*

Mathematics
Physics
Chemistry
Drawing
English
Industrial Management

B. *Non-technical Courses*

History
Government
Economics
Psychology
Speech

C. *Major Field Courses*

Specialized instruction related to the particular field of study

A student desiring a diploma in any one of the six fields must establish credit in each course listed or its equivalent. Students may transfer credit from other institutions, substitute work-experience for certain courses, or pass examina-

tions for advanced standing to establish credit equivalent to that received for satisfactorily completing a course. Courses not listed on the charts may be substituted for certain non-technical or major field courses upon written consent of the educational office. No substitutions for fundamental courses will be allowed.

Full-time Students. Six terms (two years) are required by full-time students to complete any program. Students who do not follow the sequence as indicated in the charts on the following pages may have difficulty in arranging a satisfactory schedule.

Part-time Students. Many who enroll are working and thus are in a position to go to school only part-time. Such students will require more than two years to complete the work; however, they should be guided by the charts in scheduling their own sequence of courses.

Students Not Candidates for Diplomas. A large number of courses are described in this catalog in addition to those included in the programs of study. Students not candidates for diplomas may enroll in any course or group of courses for which they can meet the prerequisites.

Technical Aide. Students who have earned the Associate Technical Aide diploma are eligible to become candidates for the Technical Aide diploma. Approved plans of study for individual students must include 48 credit-points of work selected from courses which will continue the student's field of specialization. Distribution of credit-points for the Technical Aide diploma must be as follows:

Major field	20 to 28 credit-points
Non-technical courses	12 to 16 credit-points
Electives	4 to 16 credit-points

Charts. The charts shown on the following pages indicate the programs of study for the Associate Technical Aide diploma only, in five of the six fields. Students will find these charts helpful in planning their programs and schedules of classes since the charts indicate the order in which courses should be taken. Supplementary material for the curriculum in Building Construction Technology will be available.

I

Basic Industrial Technology

Program of Study

The course number and name for each required subject are given for each term of work. Complete descriptions of these courses are given in the following section of this catalog. The number of credit-points for each course follows the name.

First Term

601	Industrial English	4
604	Practical Speaking	2
701	Industrial Production	4
801	Technical Mathematics I	4
1201	Human Relations	2
		16

Second Term

101	Technical Chemistry	4
201	Technical Drawing I	4
802	Technical Mathematics II	4
1101	Principles of Machines	4
		16

Third Term

202	Technical Drawing II	4
703	Production Control	4
803	Technical Mathematics III	4
1102	Heat	4
		16

Fourth Term

401	Elements of Electricity	4
709	Human Relations for Supervisors	4
806	Graphical Computations	4
1310	Materials and Processes	4
		16

Fifth Term

203	Machine Drawing	4
301	Economics of Industry	4
501	American Institutions	2
706	Motion and Time Study I	4
1202	Industrial Psychology	2
		16

Sixth Term

206	Tool Design	4
502	History of Industry	2
602	Technical Report Writing	4
714	Production Cost Analysis	4
717	Production Layout	2
		16

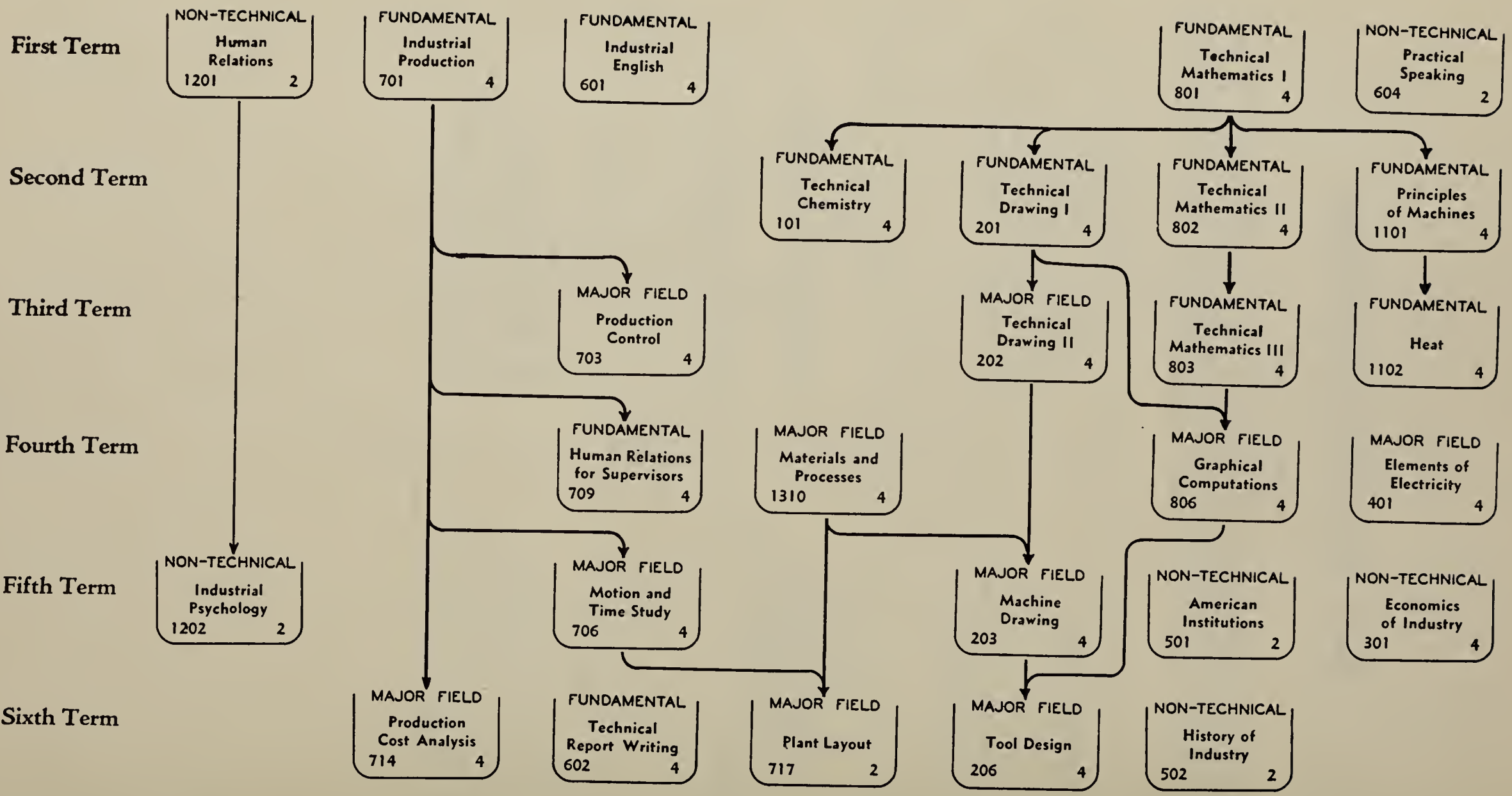

CHART I. BASIC INDUSTRIAL TECHNOLOGY

All courses listed on the preceding chart are described in the following section of this catalog. An attempt has been made on this chart to indicate by means of flow lines which courses must precede others. Certain flow lines have been omitted to simplify the chart. Information in regard to prerequisites is given with the course descriptions.

Reading the Chart. The flow lines show graphically and at a glance the close interrelationship between courses. It should be apparent that mathematics plays an important role in this major field. Credit must be established in Technical Mathematics I before a student is eligible to enroll in any other technical course.

As specialization is carried forward, a greater number of courses are required before a student may enter an advanced class. For example, to be eligible to enroll in course 203, Machine Drawing, a student must have established credit in Technical Mathematics I and II, Technical Drawing I and II, and Materials and Processes. On the chart these courses, which must precede course 203, are shown connected by flow lines to course 203. In a similar manner the flow lines show the sequence to precede any particular course.

It will be observed that some courses have no prerequisites. An example of this is Economics of Industry, course number 301. Such courses may be taken in any term. However, their positions on the chart indicate the best time for students enrolled in this particular plan of study to take them.

Objectives of This Program. This program is offered in most centers where the Division of Technical Institutes operates. While there is not the high degree of specialization that is characteristic of the other five programs, the courses composing this major field were carefully selected for the purpose of meeting the most common needs of the largest group of students. Those who have completed this program will qualify as engineering aides in engineering production departments. Students will need to adapt their knowledge and skill to the particular tasks assigned. The training in drafting and elementary design is comprehensive enough to insure qualified performance in this field. Likewise a knowledge of the rudiments of personnel relations, production control, and costs should qualify a student to fit into a variety of assignments.

Abbreviated Program. Some students may be deprived of the opportunity of completing the entire program because of outside limitations. For such students a limited amount of training taken on a part-time basis may be scheduled in either of two ways: (1) The sequence including 701, 703, 706, 709, 714, 717, 1201, and 1310 is homogeneous and should be helpful for supervisory personnel. (2) A second sequence including 201, 202, 203, 206, 801, 802, 803, 806, and 1310 will be especially beneficial for persons interested in drafting and elementary design. While such limited programs are not recommended because they lack much that is fundamental, they may meet the needs of some who otherwise would be deprived of any additional training after high school. If a night schedule is in operation, such limited sequences can be taken by those who have full-time day employment.

II

Drafting and Mechanical Technology

Program of Study

The course number and name for each required subject are given for each term of work. Complete descriptions of these courses are given in the following section of this catalog. The number of credit-points for each course follows the name.

First Term

601	Industrial English	4
604	Practical Speaking	2
701	Industrial Production	4
801	Technical Mathematics I	4
1201	Human Relations	2
		16

Second Term

101	Technical Chemistry	4
201	Technical Drawing I	4
802	Technical Mathematics II	4
1101	Principles of Machines	4
		16

Third Term

202	Technical Drawing II	4
401	Elements of Electricity	4
803	Technical Mathematics III	4
1102	Heat	4
		16

Fourth Term

301	Economics of Industry	4
806	Graphical Computations	4
901	Fundamentals of Mechanics	4
1310	Materials and Processes	4
		16

Fifth Term

203	Machine Drawing	4
501	American Institutions	2
709	Human Relations for Supervisors	4
902	Strength of Materials	4
1202	Industrial Psychology	2
		16

Sixth Term

206	Tool Design	4
502	History of Industry	2
602	Technical Report Writing	4
903	Mechanism	6
		16

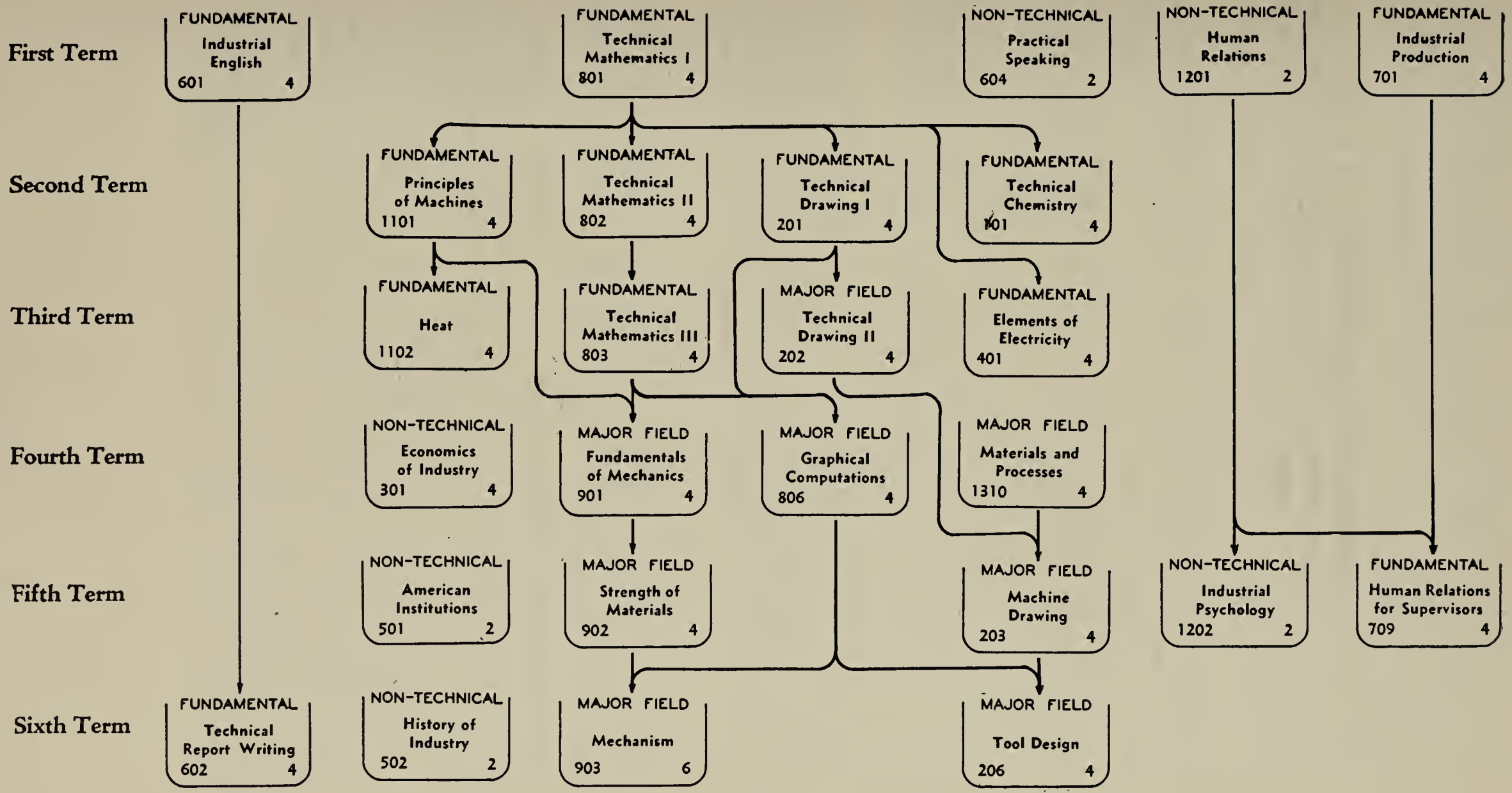
First Term
Second Term
Third Term
Fourth Term
Fifth Term
Sixth Term
FUNDAMENTAL Industrial English 601 4
FUNDAMENTAL Technical Mathematics I 801 4
NON-TECHNICAL Practical Speaking 604 2
NON-TECHNICAL Human Relations 1201 2
FUNDAMENTAL Industrial Production 701 4
FUNDAMENTAL Principles of Machines 1101 4
FUNDAMENTAL Technical Mathematics II 802 4
FUNDAMENTAL Technical Drawing I 201 4
FUNDAMENTAL Technical Chemistry 101 4
FUNDAMENTAL Heat 1102 4
FUNDAMENTAL Technical Mathematics III 803 4
MAJOR FIELD Technical Drawing II 202 4
FUNDAMENTAL Elements of Electricity 401 4
NON-TECHNICAL Economics of Industry 301 4
MAJOR FIELD Fundamentals of Mechanics 901 4
MAJOR FIELD Graphical Computations 806 4
MAJOR FIELD Materials and Processes 1310 4
NON-TECHNICAL American Institutions 501 2
MAJOR FIELD Strength of Materials 902 4
MAJOR FIELD Machine Drawing 203 4
NON-TECHNICAL Industrial Psychology 1202 2
FUNDAMENTAL Human Relations for Supervisors 709 4
FUNDAMENTAL Technical Report Writing 602 4
NON-TECHNICAL History of Industry 502 2
MAJOR FIELD Mechanism 903 6
MAJOR FIELD Tool Design 206 4

CHART II. DRAFTING AND MECHANICAL TECHNOLOGY

All courses listed on the preceding chart are described in the following section of this catalog. An attempt has been made on this chart to indicate by means of flow lines which courses must precede others. Certain flow lines have been omitted to simplify the chart. Information in regard to prerequisites is given with the course descriptions.

Reading the Chart. The flow lines show graphically and at a glance the close interrelationship between courses. It should be apparent that mathematics plays an important role in this major field. Credit must be established in Technical Mathematics I before a student is eligible to enroll in any other technical course.

As specialization is carried forward a greater number of courses are required before a student may enter an advanced class. For example, to be eligible to enroll in course 203, Machine Drawing, a student must have established credit in Technical Mathematics I and II, Technical Drawing I and II, and Materials and Processes. On the chart these courses, which must precede course 203, are shown connected by flow lines to course 203. In a similar manner the flow lines show the sequence to precede any particular course.

It will be observed that some courses have no prerequisites. An example of this is Economics of Industry, course number 301. Such courses may be taken in any term. However, their positions on the chart indicate the best time for students enrolled in this particular plan of study to take them.

Objectives of This Program. Students who have completed this program of study will qualify as technologists, or engineering aides, for numerous jobs in engineering departments in such fields as mechanical or aeronautical engineering. Ordinarily, such engineering departments will be responsible for design, fabrication, production, testing and inspection, and other engineering activities.

The training in this field is specialized with reference to subject matter, not with reference to a particular product or specific industry. There is no reason why an alert graduate should not adapt his knowledge in a very short time to the peculiar needs of the industry for which he works.

Abbreviated Program. While the diploma is reserved for only those students who complete this entire program, it is recognized that some may want a narrower, more intensely specialized training. Fourteen courses, totaling 56 credit-points, may be taken out of the heart of this program; these are courses 201, 202, 203, 206, 801, 802, 803, 806, 901, 902, 903, 1101, 1102, and 1310. Specialized training of this sort will supply much of the essential technical information in this field. Such a program is not recommended because technology, specialized though it may be, rests upon a relatively broad foundation of learning. Industrial activity of any sort involves more than immediate attention to the job at hand. However, students who can not see their way through the entire program because of the time involved, or for some other valid reason, are advised to obtain whatever knowledge and training they can.

III

Electrical Technology

Program of Study

The course number and name for each required subject are given for each term of work. Complete descriptions of these courses are given in the following section of this catalog. The number of credit-points for each course follows the name.

First Term

601	Industrial English	4
604	Practical Speaking	2
701	Industrial Production	4
801	Technical Mathematics I	4
1201	Human Relations	2
		16

Second Term

101	Technical Chemistry	4
401	Elements of Electricity	4
802	Technical Mathematics II	4
1101	Principles of Machines	4
		16

Third Term

201	Technical Drawing	4
402	D.C. Circuits and Machinery	6
803	Technical Mathematics III	4
1102	Heat	4
		18

Fourth Term

301	Economics of Industry	4
403	A.C. Circuits	6
502	History of Industry	2
806	Graphical Computations	4
		16

Fifth Term

404	A.C. Machinery	6
501	American Institutions	2
709	Human Relations for Supervisors	4
1202	Industrial Psychology	2
		14

Sixth Term

405	Electrical Measurements	6
409	Electronics	6
602	Technical Report Writing	4
		16

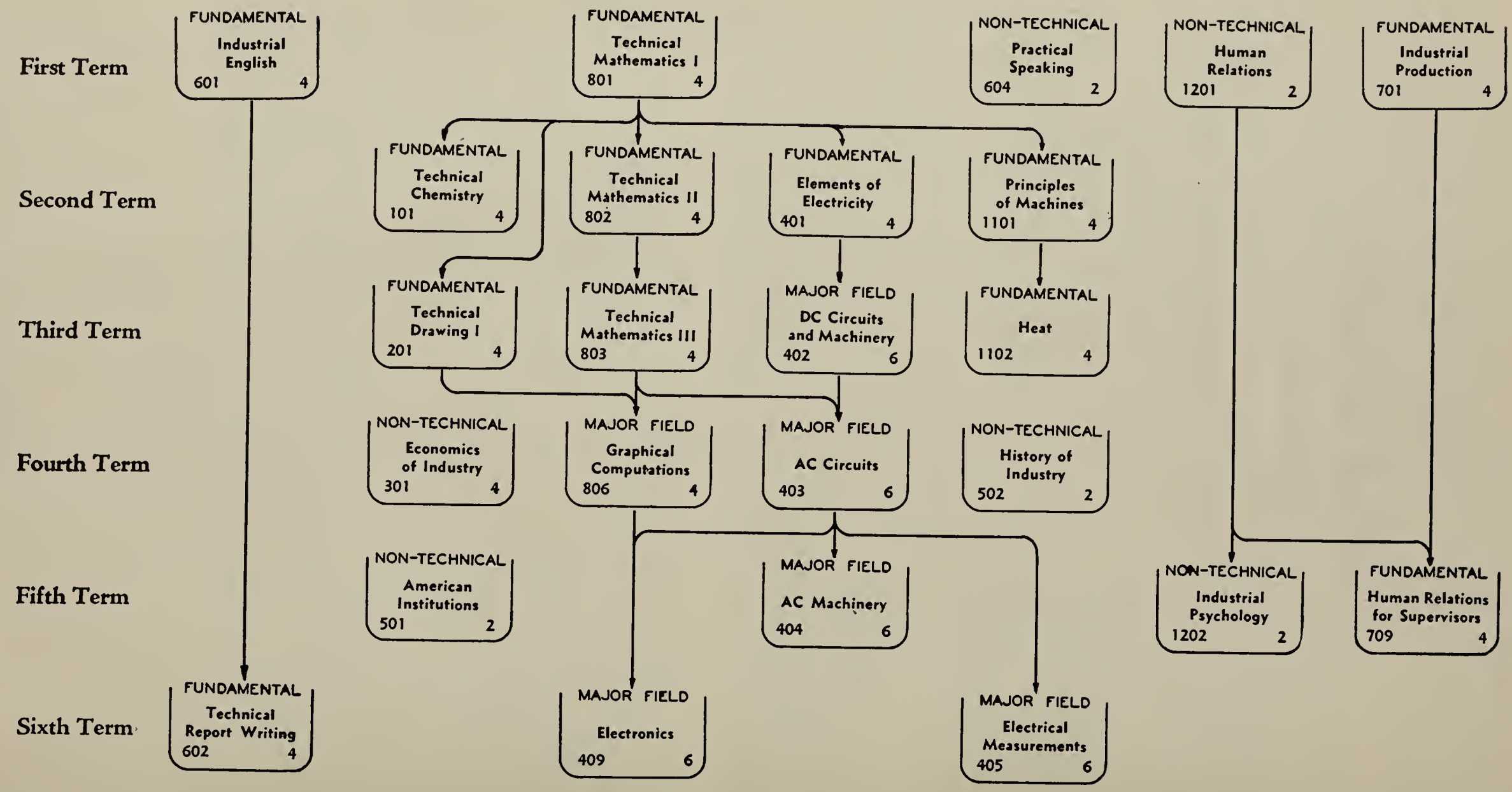
First Term
Second Term
Third Term
Fourth Term
Fifth Term
Sixth Term
FUNDAMENTAL Industrial English 601 4
FUNDAMENTAL Technical Mathematics I 801 4
NON-TECHNICAL Practical Speaking 604 2
NON-TECHNICAL Human Relations 1201 2
FUNDAMENTAL Industrial Production 701 4
FUNDAMENTAL Technical Chemistry 101 4
FUNDAMENTAL Technical Mathematics II 802 4
FUNDAMENTAL Elements of Electricity 401 4
FUNDAMENTAL Principles of Machines 1101 4
FUNDAMENTAL Technical Drawing I 201 4
FUNDAMENTAL Technical Mathematics III 803 4
MAJOR FIELD DC Circuits and Machinery 402 6
FUNDAMENTAL Heat 1102 4
NON-TECHNICAL Economics of Industry 301 4
MAJOR FIELD Graphical Computations 806 4
MAJOR FIELD AC Circuits 403 6
NON-TECHNICAL History of Industry 502 2
NON-TECHNICAL American Institutions 501 2
MAJOR FIELD AC Machinery 404 6
NON-TECHNICAL Industrial Psychology 1202 2
FUNDAMENTAL Human Relations for Supervisors 709 4
FUNDAMENTAL Technical Report Writing 602 4
MAJOR FIELD Electronics 409 6
MAJOR FIELD Electrical Measurements 405 6

CHART III. ELECTRICAL TECHNOLOGY

Course descriptions of all courses on the preceding chart are given in the following section of this catalog. An attempt has been made on this chart to indicate by means of flow lines which courses must precede others. Certain flow lines have been omitted to simplify the chart. Information in regard to prerequisites is given with the course descriptions.

Reading the Chart. The flow lines show graphically and at a glance the close interrelationship between courses. In this, as in the program in Drafting and Mechanical Technology, mathematics plays an important role. It will be observed that credit must be established in course number 801, Technical Mathematics I, before any other technical courses may be taken.

As is indicated by the flow lines, when specialization is carried forward, a greater number of courses are required before entrance in an advanced class is allowed. Course number 403, A.C. Circuits, is an example of this. To be eligible for this course a student must establish credit in Technical Mathematics I, II, and III, Elements of Electricity, and D.C. Circuits and Machinery. In a similar manner, flow lines show which courses must precede any other course.

Some courses have no prerequisites. An example of this is course number 501, American Institutions. Such courses as this may be taken any term. However, their positions on this chart indicate the best time for students enrolled in this particular plan of study to take them.

Objectives of This Program. After having completed this program of study, a student should have an adequate knowledge of the industrial applications of basic electrical concepts, and will qualify as a technologist, or engineering aide, in the field of electrical engineering. While the training is not specific for particular employment, such as radio or power generation, any graduate should be able to adapt his knowledge in a very short time to the particular needs of the industry for which he works.

Abbreviated Program. Only those students who complete the entire program will be eligible for diplomas. Nevertheless, some students may desire a shorter, more intensely specialized training. The following courses, forming the core of this program, may be taken independently: 201, 401, 402, 403, 404, 405, 409, 801, 802, 803, and 806. This more intensive program would supply much of the essential technical information in this field. Short programs of this sort are not recommended because this technology, however specialized it may be, rests upon a relatively broad foundation of learning. It is recognized, however, that some students may not be able to carry the total program because of the time involved or for some other valid reason. Such students are advised to enroll for whatever portion of the program they can.

IV

Supervision and Production Technology

Program of Study

The course number and name for each required subject are given for each term of work. Complete descriptions of these courses are given in the following section of this catalog. The number of credit-points for each course follows the name.

First Term

601	Industrial English	4
604	Practical Speaking	2
701	Industrial Production	4
801	Technical Mathematics I	4
1201	Human Relations	2
		16

Second Term

101	Technical Chemistry	4
401	Elements of Electricity	4
802	Technical Mathematics II	4
1101	Principles of Machines	4
		16

Third Term

201	Technical Drawing	4
703	Production Control	4
803	Technical Mathematics III	4
1102	Heat	4
		16

Fourth Term

301	Economics of Industry	4
706	Motion and Time Study I	4
714	Production Cost Analysis	4
1310	Materials and Processes	4
		16

Fifth Term

501	American Institutions	2
709	Human Relations for Supervisors	4
715	Operation Planning	4
1202	Industrial Psychology	2
	Elective	4
		16

Sixth Term

502	History of Industry	2
602	Technical Report Writing	4
606	Conference Speaking	2
702	Industrial Safety	2
717	Plant Layout	2
719	Wage Policy	4
		16

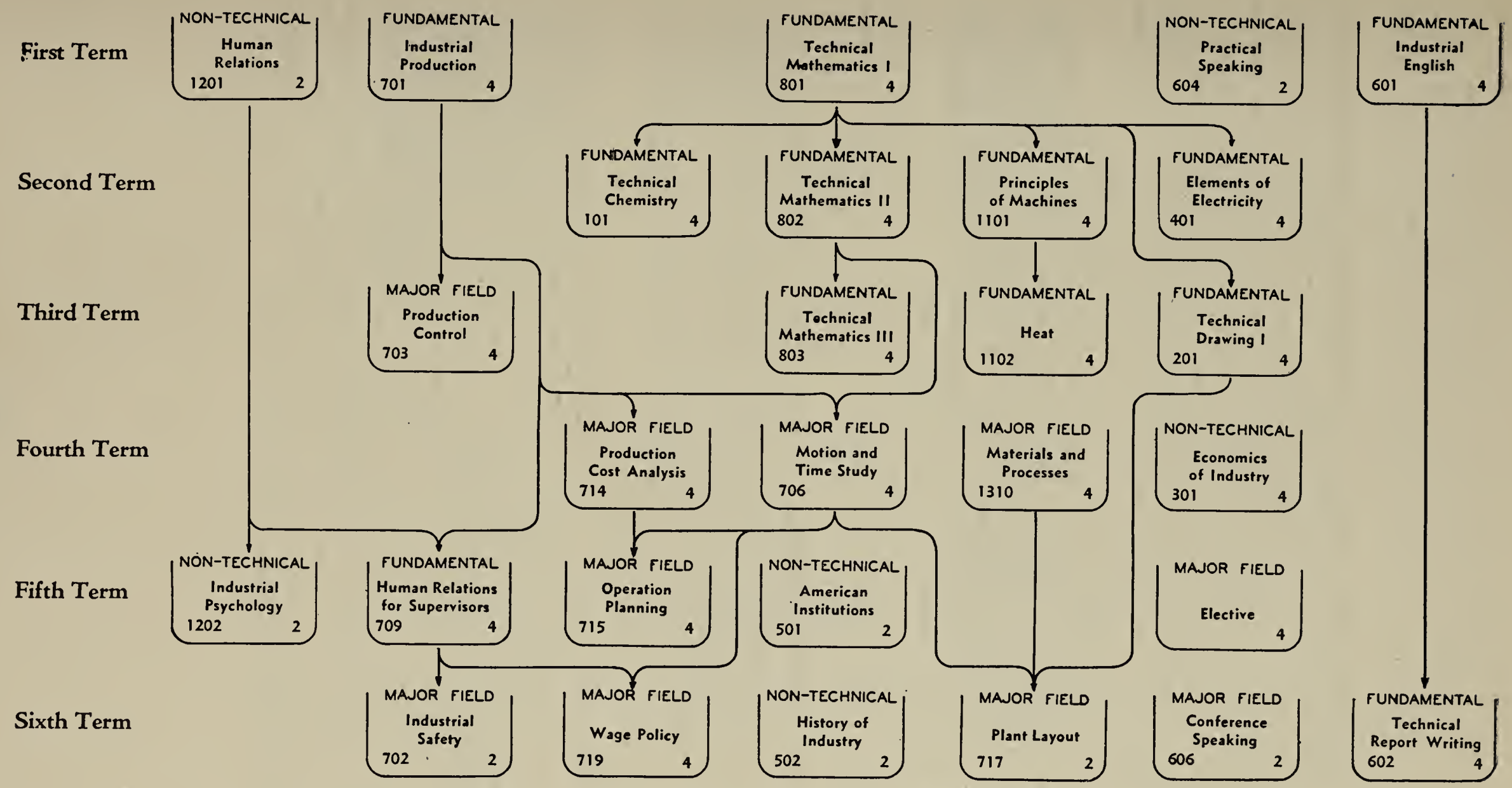
First Term
Second Term
Third Term
Fourth Term
Fifth Term
Sixth Term
NON-TECHNICAL Human Relations 1201 2
FUNDAMENTAL Industrial Production 701 4
FUNDAMENTAL Technical Mathematics I 801 4
NON-TECHNICAL Practical Speaking 604 2
FUNDAMENTAL Industrial English 601 4
FUNDAMENTAL Technical Chemistry 101 4
FUNDAMENTAL Technical Mathematics II 802 4
FUNDAMENTAL Principles of Machines 1101 4
FUNDAMENTAL Elements of Electricity 401 4
MAJOR FIELD Production Control 703 4
FUNDAMENTAL Technical Mathematics III 803 4
FUNDAMENTAL Heat 1102 4
FUNDAMENTAL Technical Drawing I 201 4
MAJOR FIELD Production Cost Analysis 714 4
MAJOR FIELD Motion and Time Study 706 4
MAJOR FIELD Materials and Processes 1310 4
NON-TECHNICAL Economics of Industry 301 4
NON-TECHNICAL Industrial Psychology 1202 2
FUNDAMENTAL Human Relations for Supervisors 709 4
MAJOR FIELD Operation Planning 715 4
NON-TECHNICAL American Institutions 501 2
MAJOR FIELD Elective 4
MAJOR FIELD Industrial Safety 702 2
MAJOR FIELD Wage Policy 719 4
NON-TECHNICAL History of Industry 502 2
MAJOR FIELD Plant Layout 717 2
MAJOR FIELD Conference Speaking 606 2
FUNDAMENTAL Technical Report Writing 602 4

CHART IV. SUPERVISION AND PRODUCTION TECHNOLOGY

A course description of each course listed on the preceding chart is given in the following section of this catalog. In these descriptions information in regard to prerequisites is given. Most of the same information is presented by means of flow lines on this chart; however, some of these lines have been omitted for simplicity.

Reading the Chart. On this chart the flow lines show quickly and graphically the organization of courses in this program. Two major divisions of the subject matter are apparent. One of these is concerned with basic technical information. It is necessary for a student to establish credit in Technical Mathematics I, course number 801, before he may enroll in subsequent courses. The other division is concerned with the techniques of management. It is necessary for a student to have an over-all picture of industry before continuing this phase of his training. For this reason credit must be established in Industrial Production, course number 701, before entrance may be obtained to subsequent courses.

As is indicated by the flow lines, when specialization is carried forward, a greater number of courses are required for entrance into advanced classes. Course number 719, Wage Policy, is an example of this. To be eligible for this course a student must establish credit in Industrial Production, Motion and Time Study, and Human Relations for Supervisors. In a similar manner flow lines show which courses must precede other courses.

Some courses, such as number 301, Economics of Industry, have no prerequisites. These courses may be taken any term. However, students are advised to take the courses in the order in which they appear on the charts.

Objectives of This Program. Students who have completed this program of study will qualify as technologists, or engineering aides, in industrial engineering. Such graduates should be able to handle technical assignments in production-engineering departments, planning, motion and time study, personnel, cost control, and production control. While the training is not specific for any particular industry, any graduate should be able to adapt his knowledge to problems he meets in his own individual employment.

Abbreviated Program. Only those students who complete the entire program will be eligible for diplomas. Occasionally students may wish a shorter program limited to the specifics in the field of supervision and production. The following courses forming that portion of this program may be taken independently: 701, 702, 703, 706, 709, 714, 715, and 719. This more intensive program would supply much of the essential technical information in this field. Such a program is not recommended, because it is felt that a person is not well trained in the field of industrial supervision and production unless he has at least a basic knowledge of the fundamental sciences. It is recognized, however, that some students may not be able to carry the total program because of the time involved, or for some other valid reason. Such students are advised to enroll for whatever portion of the program they can.

V

Chemical and Metallurgical Technology

Program of Study

The course number and name for each required subject are given for each term of work. Complete descriptions of these courses are given in the following section of this catalog. The number of credit-points for each course follows the name.

First Term

601	Industrial English	4
604	Practical Speaking	2
701	Industrial Production	4
801	Technical Mathematics I	4
1201	Human Relations	2
		16

Second Term

101	Technical Chemistry	4
401	Elements of Electricity	4
802	Technical Mathematics II	4
1101	Principles of Machines	4
		16

Third Term

102	Industrial Chemistry	4
201	Technical Drawing I	4
803	Technical Mathematics II	4
1102	Heat	4
		16

Fourth Term

103	Industrial Chemistry Laboratory	4
301	Economics of Industry	4
1001	General Metallurgy	4
1310	Materials and Processes	4
		16

Fifth Term

501	American Institutions	2
709	Human Relations for Supervisors	4
1002	Structure of Metals	4
1018	Heat Treatment of Steels	4
1202	Industrial Psychology	2
		16

Sixth Term

104	Analytical Chemistry I	6
502	History of Industry	2
602	Technical Report Writing	4
1003	Metallographic Laboratory	4
		16

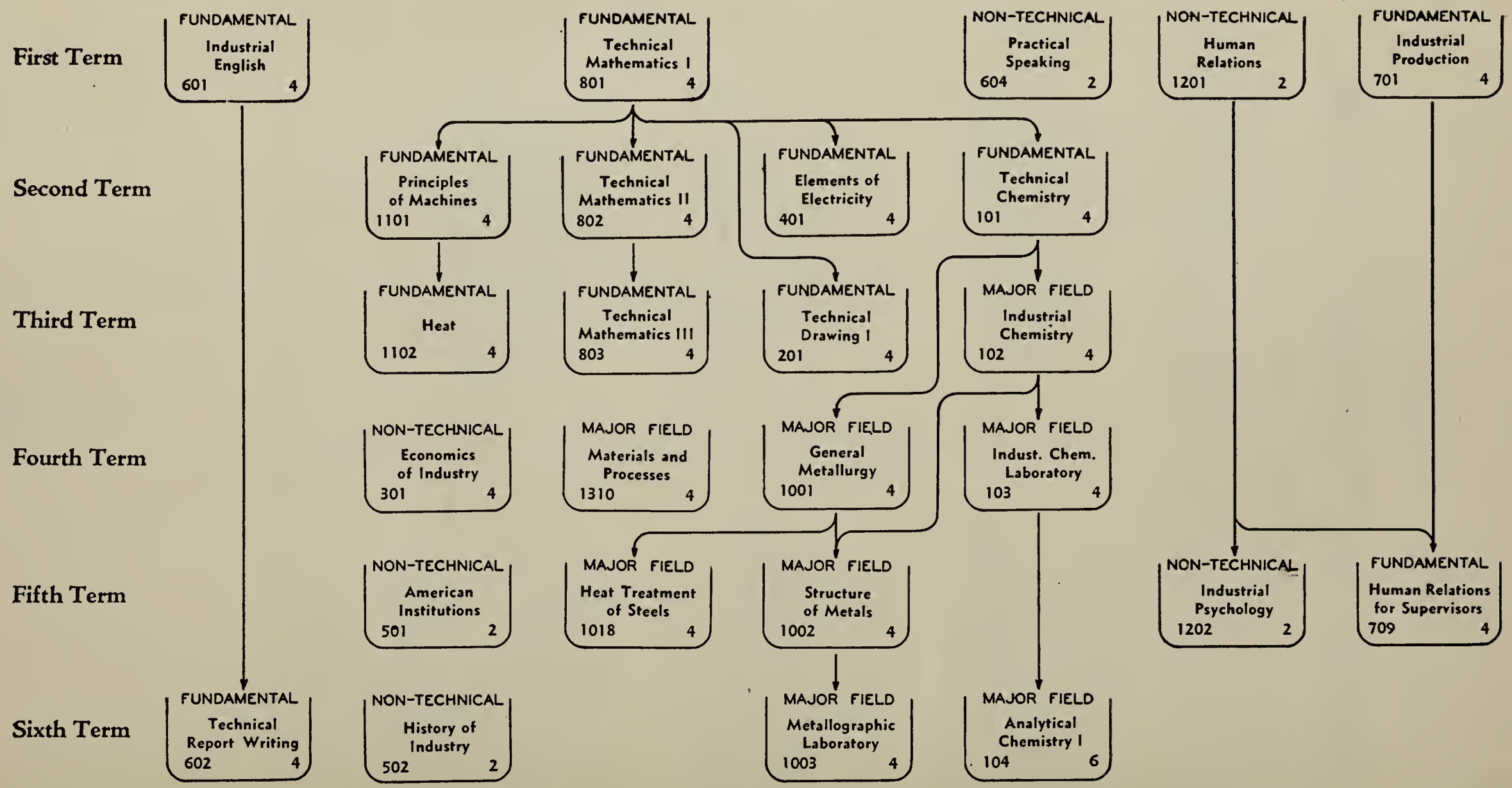
First Term
Second Term
Third Term
Fourth Term
Fifth Term
Sixth Term
FUNDAMENTAL Industrial English 601 4
FUNDAMENTAL Technical Mathematics I 801 4
NON-TECHNICAL Practical Speaking 604 2
NON-TECHNICAL Human Relations 1201 2
FUNDAMENTAL Industrial Production 701 4
FUNDAMENTAL Principles of Machines 1101 4
FUNDAMENTAL Technical Mathematics II 802 4
FUNDAMENTAL Elements of Electricity 401 4
FUNDAMENTAL Technical Chemistry 101 4
FUNDAMENTAL Heat 1102 4
FUNDAMENTAL Technical Mathematics III 803 4
FUNDAMENTAL Technical Drawing I 201 4
MAJOR FIELD Industrial Chemistry 102 4
NON-TECHNICAL Economics of Industry 301 4
MAJOR FIELD Materials and Processes 1310 4
MAJOR FIELD General Metallurgy 1001 4
MAJOR FIELD Indust. Chem. Laboratory 103 4
NON-TECHNICAL American Institutions 501 2
MAJOR FIELD Heat Treatment of Steels 1018 4
MAJOR FIELD Structure of Metals 1002 4
NON-TECHNICAL Industrial Psychology 1202 2
FUNDAMENTAL Human Relations for Supervisors 709 4
FUNDAMENTAL Technical Report Writing 602 4
NON-TECHNICAL History of Industry 502 2
MAJOR FIELD Metallographic Laboratory 1003 4
MAJOR FIELD Analytical Chemistry I 104 6

CHART V. CHEMICAL AND METALLURGICAL TECHNOLOGY

Course descriptions of all courses on the preceding chart are given in the following section of this catalog. An attempt has been made on this chart to indicate by means of flow lines which courses must precede others. Certain flow lines have been omitted to simplify the chart. Information in regard to prerequisites is given with the course descriptions.

Reading the Chart. On this chart the flow lines show quickly and graphically the organization of courses in this program. A limited sequence of courses specifically for industrial chemistry and another specifically for metallurgy may be recognized. Both of these stem from course 101, Technical Chemistry, and involve a major amount of laboratory work. For this reason it is necessary to establish credit in course 101 early in the program.

As is indicated by the flow lines, when specialization is carried forward, there are a greater number of courses which are required for entrance into an advanced class. Course number 1002, Structure of Metals, is an example of this. To be eligible for this course a student must establish credit in Technical Mathematics I, Technical Chemistry, Industrial Chemistry, and General Metallurgy. In a similar manner the flow lines show which courses must precede other courses.

Some courses, such as number 301, Economics of Industry, have no prerequisites. These courses may be taken any term. However, students are advised to take the courses in the order in which they appear on the charts.

Objective of This Program. Students who have completed this program of study will qualify as technologists, or engineering aides, in engineering departments of chemical or metallurgical industries. Such engineering aides might be responsible for metallurgical analysis, laboratory tests, inspection, specification preparation, production reports, or a variety of other assignments.

As in the other fields this program is specialized with reference to subject matter, not with reference to a particular product or specific industry. Regardless of the industry in which a graduate is employed, however, he should be able to adapt his knowledge in a short time to the particular needs required in his position.

Abbreviated Program. Only those students who complete the entire program will be eligible for diplomas. Some students may wish to pursue a more limited, specialized portion of the total program involving only those courses directly bearing on the major interest. Fourteen courses totaling 58 credit-points may be selected to fulfill this purpose; these courses are 101, 102, 103, 104, 801, 802, 803, 1001, 1002, 1003, 1018, 1101, 1102, and 1310. This limited program would supply much of the essential technical information in this field. Such a program is not recommended however, if the student can arrange the total schedule. Industrial activity in this as in other fields rests upon a more comprehensive foundation of learning. Nevertheless, students who can not see their way through the entire program because of the time involved, or for some other valid reason, are advised to obtain whatever knowledge and training they can.

VI

Building Construction Technology

Program of Study

A program of study in Building Construction has been developed for students enrolling in certain centers during or after the 1946 fall term. This program is directed toward the problem of supplying technically trained men in a field currently undermanned. The objective is not to train skilled artisans or professional designers. Rather it is to train technical assistants who work with both of the other groups. Persons so trained may hope to qualify as supervisors, estimators, junior designers and detailers, office personnel, and other similar kinds of employees.

Three major groups of employers are cooperating with the Division of Technical Institutes in developing this program of study. These are (1) the architects, or those responsible for design, (2) the contractors, or those responsible for construction, and (3) the supply dealers, or the persons who fill the material needs of construction. Some common denominators in the instructional programs best qualify personnel for employment in each of these phases of building construction. Likewise there are a number of special requirements. Training needs in each phase of this work have been determined by the Technical Institute staff in cooperation with representatives of the building industry. A typical program of study in the field of Building Construction Technology is given below:

First Term

201	Technical Drawing I	4
219	Plan Reading	2
601	Industrial English	4
801	Technical Mathematics I	4
1201	Human Relations	2
		16

Second Term

101	Technical Chemistry	4
*212	Survey of Architectural Drawing	4
501	American Institutions	2
604	Practical Speaking	2
802	Technical Mathematics II	4
		16

Third Term

*213	Frame Construction	4
301	Economics	4
803	Technical Mathematics III	4
*1313	Building Materials	4
		16

Fourth Term

*218	Masonry Construction	4
602	Technical Report Writing	4
1101	Principles of Machines	4
*1317	Elementary Surveying	4
		16

Fifth Term		*Sixth Term*	
502 History of Industry	2	*220 History of Architecture	2
*806 Graphical Computations	4	*221 Architectural Details	4
*1312 Specifications	2	*916 Mechanics of Materials	4
*1314 Building Regulations	4	1202 Industrial Psychology	2
*1315 Quantity Survey I	4	*1316 Quantity Survey II	4
	16		16

* Technical Electives. (Any program including 48 credit-points of technical electives in an approved plan of study will be accepted.)

Course Descriptions

Course No.	Course Name	Credit Points	Tuition and Other Fees

TI 101 Technical Chemistry — 4 — $21.00

2 hours recitation, 3 hours laboratory each week
Must be preceded by 801
General principles of chemistry, including a study of elements and their simpler compounds. Special emphasis on topics most likely to be of importance in industrial activities.

TI 102 Industrial Chemistry — 4 — $21.00

2 hours recitation, 3 hours laboratory each week
Must be preceded by 101
Lectures dealing with chemical principles and practical applications of chemical laws and theories. Laboratory work designed to give the student training in fundamenal laboratory methods and procedures.

TI 103 Laboratory in Industrial Chemistry — 4 — $20.00

6 hours laboratory each week
Must be preceded by 102
Systematic semimicro analysis with emphasis upon techniques in industry today.

TI 104 Technical Analytical Chemistry I — 6 — $29.00

2 hours recitation, 6 hours laboratory each week
Must be preceded by 103
Simple principles with an introduction to gravimetric and titrimetric methods.

TI 105 Technical Analytical Chemistry II — 4 — $20.00

6 hours laboratory each week
Must be preceded by 104
Continuation of 104, with individual special assignments for students having certain types of industrial employment.

TI 106 Petroleum Refinery Practices I — 4 — $19.00

4 hours recitation each week
Must be preceded by 101
A first course in the technical aspects of processing crude oil in refinery. Discussion of various distilling and cracking processes, manufacture and storage of greases and gasolines, special safety problems of refineries, management problems and accounting.

TI 107 Petroleum Refinery Practices II — 4 — $19.00

4 hours recitation each week
Must be preceded by 106
Continuation of 106.

TI 108 Petroleum Refinery Practices III — 3 — $15.00

3 hours recitation each week
Must be preceded by 107
Continuation of 107.

TI 109 Industrial Physical Chemistry — 6 — $29.00

2 hours recitation, 6 hours laboratory each week
Must be preceded by 104
General properties of matter, phenomena of solutions, electrochemistry, thermochemistry, chemical statics and dynamics.

Course No.	Course Name	Credit Points	Tuition and Other Fees
TI 110	**Laboratory Techniques I** 6 hours laboratory each week Must be preceded by 105 Practice in special laboratory analysis of acids, alkalies, and solvents.	4	$20.00
TI 111	**Laboratory Techniques II** 6 hours laboratory each week Must be preceded by 105 Practice in special laboratory analysis of oils.	4	$20.00
TI 112	**Laboratory Techniques III** 6 hours laboratory each week Must be preceded by 105 Practice in special laboratory analysis of soaps and fats.	4	$20.00
TI 113	**Introduction to Plastics** 2 hours recitation each week A popular general survey of plastics and their uses.	2	$10.00 (Non-technical)
TI 114	**Industrial Plastics I** 4 hours recitation each week Must be preceded by 101 History, definitions and classifications, uses, and processing of various plastics.	4	$19.00
TI 115	**Industrial Plastics II** 2 hours recitation, 3 hours laboratory each week. Must be preceded by 114 Discussion and laboratory in the practical and economical solution of design problems.	4	$19.00
TI 116	**Boiler Feed Water Conditioning** 4 hours recitation each week Must be preceded by 101 Methods of feed-water conditioning designed to prevent scale formation, corrosion, embrittlement, and carry-over in steam generating systems.	4	$19.00
TI 117	**Petroleum Geology** 4 hours recitation each week Origin and accumulation of petroleum and natural gas, methods of locating new fields, drilling and producing, economics of production.	4	$19.00
TI 201	**Technical Drawing I** 6 hours laboratory each week Must be preceded by 801 (Deposit for rental of drawing instruments, $10. At the end of the term, $9 will be refunded if set is intact. This provision is optional for the student.) Introduction to technical drawing including use of instruments, lettering, orthographic projection, simple working drawings, and sketching. Emphasis upon comprehension of industrial drawings.	4	$17.00
TI 202	**Technical Drawing II** 6 hours laboratory each week Must be preceded by 201 Detail and assembly working drawings, computations and layouts as involved in making industrial drawings.	4	$17.00
TI 203	**Machine Drawing** 6 hours laboratory each week Must be preceded by 202, 802, 1310 Preparation of complete working drawings from layout of a simple mechanism. Introduction of limit dimension and computations.	4	$17.00

Course No.	Course Name	Credit Points	Tuition and Other Fees

TI 205 Freehand Technical Sketching — 2 — $9.00

3 hours laboratory each week
Must be preceded by 201
Materials required, techniques involved, and practice in making technical sketches for shop and drafting room use.

TI 206 Tool Design — 4 — $17.00

6 hours laboratory each week
Must be preceded by 203, 806
Tool design standards, manufacturing processes, materials; welding, cutting tools; jigs, fixtures, dies, gages; machine tools and hand tools.

TI 207 Fixture Design — 4 — $17.00

6 hours laboratory each week
Must be preceded by 206
Survey of fixture design, rotary, double, crosshole, and large revolving fixtures; cradle and knee-type rotary fixtures; pillar fixtures, fixtures for milling machine, grinder, etc.; pneumatic fixtures for holding work. Design of a simple fixture.

TI 208 Die Design — 4 — $17.00

6 hours laboratory each week
Must be preceded by 206
Survey of die design. Blanking, piercing, progressive, shaving, broaching, forming, trimming, drawing, extruding, and swaging dies. Design of a simple die.

TI 209 Gage Design — 4 — $17.00

6 hours laboratory each week
Must be preceded by 206
Measurement, interchangeable manufacture, limit dimensions, gage materials; reference, plug and ring, taper, snap, thread, gear tooth, and inspection gages. Design of a simple gage.

TI 210 Jig Design — 4 — $17.00

6 hours laboratory each week
Must be preceded by 206
Survey of jig design practice; standard jig parts; table and latch jigs; wedge, eccentric, and sliding plate jigs; locating schemes; rigidity. Design of a simple jig.

TI 211 Duplication Processes and Materials — 2 — $10.00

2 hours recitation each week
Must be preceded by 201
Introduction to duplication methods, including photochemical processes, blue prints, Ozalid prints, black and white prints, photocopies, multilith, hectograph, photography, and printing.

TI 212 Survey of Architectural Drawing — 4 — $17.00

6 hours laboratory each week
Must be preceded by 201
Purpose of architectural drawings and stages of planning they serve; working drawings and specifications, isometric and perspective views; discussion of models.

TI 213 Wood Frame Construction — 4 — $17.00

6 hours laboratory each week
Must be preceded by 212
Simple wood frame structures, such as houses; framing members and details, elementary design problems.

Course No.	Course Name	Credit Points	Tuition and Other Fees
TI 214	**Special Problems in Electrical Layouts** 6 hours laboratory each week Must be preceded by 203, 404 Individual projects to be arranged with counselor.	4	$17.00
TI 215	**Special Problems in Aeronautical Drafting** 6 hours laboratory each week Must be preceded by 902 Individual projects to be arranged with counselor.	4	$17.00
TI 216	**Elementary Structural Drafting** 6 hours laboratory each week Must be preceded by 202 Detailing simple structural steel, reinforced concrete, and wood structures.	4	$17.00
TI 217	**Industrial Production Illustration I** 6 hours laboratory each week Must be preceded by 202 A first course in surface rendering and the representation of objects by means of isometric, oblique, and perspective drawing.	4	$17.00
TI 218	**Masonry Construction** 6 hours laboratory each week Must be preceded by 212 Simple masonry structures, such as small stores; analysis of design, strength and construction details.	4	$17.00
TI 219	**Plan Reading** 2 hours recitation each week Preceded or accompanied by 201 Symbols, conventional indications, interpretation of simple building plans.	2	$10.00
TI 220	**History of Architecture** 2 hours recitation each week Must be preceded by 201 Review of ancient and modern forms of building construction.	2	$10.00
TI 221	**Architectural Details** 6 hours laboratory each week Must be preceded by 213, 218 Study and detailing of various assemblies of materials commonly used in building construction.	4	$17.00
TI 222	**Advanced Die Design** 6 hours laboratory each week Must be preceded by 208 Continuation of 208.	4	$17.00
TI 301	**Economics of Industry** 4 hours recitation each week General survey of economic principles, business organization, value and price, trade and commerce, transportation, distribution, labor problems, advertising, corporations, and public finance.	4	$19.00
TI 302	**Legislation Affecting Industrial Relations** 4 hours recitation each week (Non-technical) Wage contracts and payments, workmen's compensation and insurance, injunctions, strikes and boycotts, and statutes affecting labor.	4	$19.00

Course No.	Course Name	Credit Points	Tuition and Other Fees

TI 303 Labor Problems — 4 — $19.00

4 hours recitation each week
Problems of labor and their possible solutions, organized labor, solutions offered by liberal employers, state interference between capital and labor.

TI 304 Business Law — 4 — $19.00

4 hours recitation each week
Introduction to business law, covering persons, torts, contracts, agency, bailments, sales, unfair trade practices, and negotiable instruments.

TI 305 Building Finance — 2 — $10.00

2 hours recitation each week
Legal and financial regulations and restrictions affecting financial aspects of building construction.

TI 401 Elements of Applied Electricity — 4 — $19.00

4 hours recitation each week
Must be preceded by 801
Elements of electricity and their applications to industry.

TI 402 D.C. Circuits and Machinery — 6 — $28.00

4 hours recitation, 3 hours laboratory each week
Must be preceded by 401, 802
Direct-current machines and apparatus from the viewpoint of construction details, industrial applications, and methods of operation.

TI 403 A.C. Circuits — 6 — $28.00

4 hours recitation, 3 hours laboratory each week
Must be preceded by 402, 803
Nature of alternating current, methods of generation, single-phase currents, polyphase currents; practical concepts of power, power-factor, reactive factor, reactance and impedance; simple a.c. circuit calculations.

TI 404 A.C. Machinery — 6 — $28.00

4 hours recitation, 3 hours laboratory each week
Must be preceded by 403
Construction details and practical performance of transformers, induction motors, alternators, synchronous motors, rectifiers, and other common alternating-current apparatus.

TI 405 Electrical Measurements — 6 — $28.00

4 hours recitation, 3 hours laboratory each week
Must be preceded by 403
Elements of direct- and alternating-current measuring instruments and methods of measurements, with industrial applications.

TI 406 Power Generation and Distribution I — 4 — $19.00

4 hours recitation each week
Must be preceded by 404
Details of generating equipment, circuit breakers, bus systems, protective relays, and the part they play in a power system.

TI 407 Power Generation and Distribution II — 4 — $19.00

4 hours recitation each week
Must be preceded by 406
Structural elements of power distribution systems, such as wires and cables, insulations, line supports, d.c. and a.c. distribution, line protection.

Course No.	Course Name	Credit Points	Tuition and Other Fees

TI 409 Electronics — 6 — $28.00

4 hours recitation, 3 hours laboratory each week
Must be preceded by 403, 806
Principles of operation of the more common types of vacuum and gas tubes, thyratrons, photoelectric cells, etc., and simple circuits used with them.

TI 410 Radio Communication I — 6 — $28.00

4 hours recitation, 3 hours laboratory each week
Must be preceded by 409
Structural details and elementary principles of operation of rectifiers, amplifiers of various types, modulation, demodulation, receivers and their characteristics.

TI 411 Radio Communication II — 6 — $28.00

4 hours recitation, 3 hours laboratory each week
Must be preceded by 410
Structural details and elementary principles of operation of transmitters, transmission lines, radiation, and wave propagation.

TI 412 Illumination — 4 — $19.00

4 hours recitation each week
Must be preceded by 404
Practical measurements and calculations of light quantities; illuminants and their physical characteristics.

TI 413 Electrolysis and Electroplating — 6 — $28.00

4 hours recitation, 3 hours laboratory
Must be preceded by 103, 402
Physical principles of electrolysis including elementary concepts of ions, electrolytes, equilibrium, electromotive series, solvents; applications to industrial electroplating such as electrorefining and electrotyping.

TI 414 Wiring Standards and Underwriters Code — 3 — $15.00

3 hours recitation each week
Must be preceded by 405
An investigation of the legal and technical requirements and practices in wiring machinery, equipment, and buildings; insurance codes; building codes; underwriters' specifications.

TI 415 Special Problems in Electrical Design — 4 — $17.00

6 hours laboratory each week
Must be preceded by 405, 407, 409
Individual projects to be arranged with counselor.

TI 416 Special Problems in the Operation and Maintenance of Electric Furnaces — 4 — $19.00

4 hours recitation each week
Must be preceded by 404
Present-day practice in construction, operation, and maintenance of electrical equipment used in electric furnaces.

TI 417 General Applications of Electronics to Industry — 6 — $28.00

4 hours recitation, 3 hours laboratory each week
Must be preceded by 409
Circuits using electron tubes to control or measure, such as resistance welding, elevator leveling, counting, sorting, cathode-ray oscilloscopes, high-frequency heating, photometric measurements, etc.

TI 418 Control of Electric Motors I — 4 — $19.00

4 hours recitation each week
Must be preceded by 404
Standard controllers of electric motors used in industry.

Course No.	Course Name	Credit Points	Tuition and Other Fees
TI 419	**Control of Electric Motors II** 4 hours recitation each week Must be preceded by 418 Continuation of 418.	4	$19.00
TI 501	**Historical Review of American Institutions** 2 hours recitation each week The nature of government, democracy, the constitution, finance, commerce, public works, the general welfare.	2	$10.00 (Non-technical)
TI 502	**History of Industrial Expansion** 2 hours recitation each week The place of industry in the development of America.	2	$10.00 (Non-technical)
TI 503	**Geography of Raw Materials** 2 hours recitation each week Sources of strategic materials and the resulting effect upon industry and civilization.	2	$10.00 (Non-technical)
TI 601	**Industrial English** 4 hours recitation each week The appropriate use of the technical vocabulary as used in industrial writing.	4	$19.00
TI 602	**Technical Report Writing** 4 hours recitation each week Must be preceded by 601 The appropriate use of the vernacular in the preparation and presentation of industrial reports.	4	$19.00
TI 603	**Advanced Technical Report Writing** 4 hours recitation each week Must be preceded by 602, 704 Continuation of 602 with individual assignments for students engaged in specific industrial positions.	4	$19.00
TI 604	**Fundamentals of Practical Speaking** 2 hours recitation each week Fundamentals of organization and presentation of material, mannerisms, voice, audience reaction.	2	$10.00 (Non-technical)
TI 605	**Practical Speaking for Special Occasions** 2 hours recitation each week Must be preceded by 604 Continuation of 604.	2	$10.00 (Non-technical)
TI 606	**Conference Speaking** 2 hours recitation each week Must be preceded by 604 Training and practice in conducting and participating in small group conferences, shop committees, instructional groups, problem solving groups.	2	$10.00 (Non-technical)
TI 701	**Fundamentals of Industrial Production** 4 hours recitation each week Detailed survey of industrial organization, duties of management, planning, quality control, personnel problems, safety, wages and policy.	4	$19.00
TI 702	**Industrial Safety** 2 hours recitation each week Must be preceded by 701 Economics of accident prevention, mechanical safeguards, fire prevention, occupational disease, hygiene and first aid, safety codes, workmen's compensation, educational programs.	2	$10.00

Course No.	Course Name	Credit Points	Tuition and Other Fees

TI 703 Production Control — 4 — $19.00

4 hours recitation each week
Must be preceded by 701
Basic consideration of methods, planning and scheduling, route sheets, rate of output, assembly.

TI 704 Collection and Presentation of Technical Data — 4 — $19.00

4 hours recitation each week
Must be preceded by 201, 701, 803
Survey procedures, elementary statistical concepts, tabular and graphical representations, interpretation of reports.

TI 705 Industrial Accounting Fundamentals — 4 — $19.00

4 hours recitation each week
A basic presentation of the fundamental mechanics (rules for debit and credit, etc.) of accounting, principles of account classification, business forms and procedures, financial and operating statements, and the elements of cost accounting—all from the viewpoint of industrial corporations.

TI 706 Motion and Time Study I — 4 — $19.00

4 hours recitation each week
Must be preceded by 701, 802
Overview of the techniques of motion and time study. Discussion of process charts, operation charts, micromotion study, therblig check lists, motion economy, and stop-watch time study.

TI 707 Motion and Time Study II — 4 — $19.00

4 hours recitation each week
Must be preceded by 706
Continuation of 706 with emphasis on analysis and interpretation of data, leveling, allowances and wage payment methods.

TI 708 Advanced Motion and Time Study — 4 — $19.00

4 hours recitation each week
Must be preceded by 707
Operation analysis, micromotion study, simo and possibility charts, standard data or formulae construction.

TI 709 Human Relations for Supervisors — 4 — $19.00

4 hours recitation each week
Must be preceded by 701, 1201
Individual analysis of human relations problems arising from induction, training, discipline, grievances, absenteeism, promotions, transfers, discharges, etc.

TI 710 Standards Determination and Specification Writing — 4 — $19.00

4 hours recitation each week
Must be preceded by 707
Discussion of and practice in recording jobs for time study, practice in rating, analysis of time study work, reporting and summarizing, preparation of specifications.

TI 712 Job Evaluation — 4 — $19.00

4 hours recitation each week
Must be preceded by 706
Principles, practices, and problems of job evaluation in wage determination programs.

TI 713 Cost Control — 4 — $19.00

4 hours recitation each week
Must be preceded by 705, 802
Standard costs, estimating costs, distribution costs, various systems of cost accounting.

Course No.	Course Name	Credit Points	Tuition and Other Fees

TI 714 Production Cost Analysis — 4 — $19.00

4 hours recitation each week
Must be preceded by 701
The relative economy of engineering alternatives, variation of labor, materials and overhead costs, with methods, physical facilities, and volumes.

TI 715 Operation Planning — 4 — $19.00

4 hours recitation each week
Must be preceded by 706, 714
The pre-production planning of the most economical methods, machines, operations, and materials for the manufacture of production items.

TI 716 Tool Engineering — 4 — $19.00

4 hours recitation each week
Must be preceded by 201
The use, selection, and design of machine tools and other tools for most economical production, including proper operation sequence of items for most efficient manufacture.

TI 717 Production Layout — 2 — $10.00

2 hours recitation each week
Must be preceded by 201, 706, 1310
The arrangement of stock, machines, and building space for the most economical handling of materials and personnel in production. Analysis of working plans.

TI 718 Planning Problem Seminar — 2 — $10.00

2 hours recitation each week
Must be preceded by 703, 717
Special individual problems and assignments.

TI 719 Wage Policy — 4 — $19.00

4 hours recitation each week
Must be preceded by 706, 709
Overview of constituent factors influencing wages, job description and evaluation, personnel relations, wage incentives, rates, etc.

TI 720 Personnel Management — 4 — $19.00

4 hours recitation each week
Must be preceded by 709
Personnel department, organized labor, employees in management, employment procedures and policy, training, job evaluation, wages and wage systems, extra-industrial activities, safety and health.

TI 721 Production Control Problems — 4 — $19.00

4 hours recitation each week
Must be preceded by 703
Industrial techniques for the solution of production control problems.

TI 722 Business Organization and Management — 4 — $19.00

4 hours recitation each week
Fundamental principles of management applicable to organization, costs, pay plans, handling materials, personnel, and marketing.

TI 723 Sales and Advertising — 4 — $19.00

4 hours recitation each week
Must be preceded by 301
Marketing functions including transportation, advertising, methods, sales management, prices and competition; sales supervision.

TI 801 Technical Mathematics I — 4 — $19.00

4 hours recitation each week
Applications of the basic principles of arithmetic and geometry to industrial problems.

Course No.	Course Name	Credit Points	Tuition and Other Fees

TI 802 Technical Mathematics II — 4 — $19.00

4 hours recitation each week
Must be preceded by 801
Applications of the basic principles of algebra to industrial problems; use of the slide rule.

TI 803 Technical Mathematics III — 4 — $19.00

4 hours recitation each week
Must be preceded by 802
Applications of the basic principles of trigonometry to industrial problems; use of the slide rule continued.

TI 805 Technical Mathematics (Advanced) — 6 — $29.00

6 hours recitation each week
Must be preceded by 803
Applications of the basic concepts of analytical geometry and calculus to industrial problems.

TI 806 Graphical Computations — 4 — $17.00

6 hours laboratory each week
Must be preceded by 201, 803
Solution of engineering problems involving descriptive and analytical geometry.

TI 807 Graphical Representation — 4 — $17.00

6 hours laboratory each week
Must be preceded by 201, 803
A survey of industrial use of charts, graphs, curves, alignment charts, special slide rules; elementary statistical concepts.

TI 901 Fundamentals of Mechanics — 4 — $19.00

4 hours recitation each week
Must be preceded by 803, 1101
Forces, vectors, moments, equilibrium, friction, center of gravity, moments of inertia, force, mass, acceleration, velocity, inertia, work, energy, power, impulse, momentum.

TI 902 Strength of Materials — 4 — $19.00

4 hours recitation each week
Must be preceded by 901
Stress, tension, compression, shear, riveted joints, beams, shafts, columns.

TI 903 Mechanism — 6 — $26.00

2 hours recitation, 6 hours laboratory each week
Must be preceded by 806, 901
Displacements, motions, and velocities, elementary principles of simple linkages, gears, cams, and flexible connections.

TI 904 Machine Design I — 4 — $18.00

2 hours recitation, 3 hours laboratory each week
Must be preceded by 203, 902, 903
Discussion of principles involved in design of simple machine parts; laboratory work in application of laws of mechanics to special problems; standards and industrial practices.

TI 905 Heat Power I — 4 — $19.00

4 hours recitation each week
Must be preceded by 1102
Laws of perfect gases and vapors and their application to compressors, internal combustion engines, refrigeration, and heating.

Course No.	Course Name	Credit Points	Tuition and Other Fees

TI 906 Heat Power II — 4 — $19.00

4 hours recitation each week
Must be preceded by 905
Fuels and fuel-burning equipment, construction and performance of engines, turbines, boilers, condensers and accessories.

TI 907 Heating, Ventilating and Air Conditioning — 4 — $19.00

4 hours recitation each week
Must be preceded by 905
Types of heating systems, heat transmission and insulation, heat exchangers, fans and ducts, air-vapor mixtures, air conditioning.

TI 908 Principles of Industrial Lubrication — 4 — $19.00

4 hours recitation each week
Must be preceded by 102, 901
Properties of oils and greases, oil film formation, friction and other factors, oiling devices and systems, lubrication of machines.

TI 909 Machine Design II — 4 — $18.00

2 hours recitation, 3 hours laboratory each week
Must be preceded by 904
Continuation of 904.

TI 910 Diesel Engines — 4 — $19.00

4 hours recitation each week
Must be preceded by 1102
A basic course in the study of the diesel engines—production, operation, and maintenance.

TI 911 High-Speed Diesel — 4 — $19.00

4 hours recitation each week
Must be preceded by 910
Continuation of 910 with emphasis upon high-speed diesel engines.

TI 912 Boiler Plant Operation — 4 — $19.00

4 hours recitation each week
Must be preceded by 1102
Basic principles of combustion and steam generation related to boiler plant operation, control, and maintenance.

TI 913 Steam Power Plant Equipment — 5 — $22.00

3 hours recitation, 3 hours laboratory each week
Must be preceded by 1102
General principles of construction, operation, and testing of power plant equipment.

TI 914 Power Plant Testing — 4 — $19.00

4 hours recitation each week
Must be preceded by 913
Methods used in the interpretation of power plant test codes; testing of equipment.

TI 915 Refrigeration — 4 — $19.00

4 hours recitation each week
Must be preceded by 1102
Basic principles of refrigeration and their application to the installation, operation, and maintenance of refrigeration equipment.

TI 916 Mechanics of Materials — 4 — $19.00

4 hours recitation each week
Must be preceded by 803
Study of stresses, deformation, resistance; testing of simple elements and common structural materials.

Course No.	Course Name	Credit Points	Tuition and Other Fees
TI 1001	**General Metallurgy**	4	$19.00
	4 hours recitation each week Must be preceded by 101 Fundamental considerations common to all production metallurgy: refining processes, forming metals, constitution diagrams, alloys, testing, etc.		
TI 1002	**Structure and Properties of Metals**	4	$19.00
	4 hours recitation each week Must be preceded by 102, 1001 Microstructures in metals and alloys and their relationship to properties.		
TI 1103	**Metallographic Laboratory Practice**	4	$19.00
	6 hours each week Must be preceded by 1002 Practice in the preparation and microscopic examination of metals.		
TI 1004	**Metallography and Heat Treatment**	6	$29.00
	4 hours recitation, 3 hours laboratory each week Must be preceded by 1003 Heat treatment and its effect upon the microstructure and properties of steel.		
TI 1005	**Inspection of Metals**	4	$19.00
	2 hours recitation, 3 hours laboratory each week Must be preceded by 1004 Common methods employed in the inspection of metals.		
TI 1006	**Magnetic Inspection**	4	$19.00
	4 hours recitation each week Must be preceded by 1005 The principles of magnetic inspection.		
TI 1007	**Metallurgy of Welding**	4	$19.00
	4 hours recitation each week Must be preceded by 1004 The principles of metallurgy applied to welded joints.		
TI 1008	**Metallurgy of Machine Shop Practices**	4	$19.00
	4 hours recitation each week Must be preceded by 1004 The principles of metallurgy applied to machine shop practices.		
TI 1009	**Pyrometry**	6	$28.00
	4 hours recitation, 3 hours laboratory each week Must be preceded by 102, 401 Discussion of principles and laboratory practice in the use of thermoelectric, resistance, radiation, and optical pyrometers.		
TI 1010	**Metallurgical Analyses**	4	$19.00
	2 hours recitation, 3 hours laboratory each week Must be preceded by 102 Principles and methods of chemical analysis of metals.		
TI 1011	**Plastic Forming of Metals**	4	$19.00
	4 hours recitation each week Must be preceded by 1004 Industrial methods commonly used in the fabrication of metals and alloys.		
TI 1012	**Ores and Their Preparation**	4	$19.00
	4 hours recitation each week Must be preceded by 102 Ore classification, various methods of separation from gangue preparatory to extraction of the metal.		

Course No.	Course Name	Credit Points	Tuition and Other Fees
TI 1013	**Slags, Fluxes, and Refractories** 4 hours recitation each week Must be preceded by 1012 Purpose of slags, proper choice of fluxes, refractories used in pyrometallurgical processes.	4	$19.00
TI 1014	**Metallurgical Fuels** 4 hours recitation each week Must be preceded by 102 The preparation, use, and limitations of various fuels used in metallurgy.	4	$19.00
TI 1015	**Non-ferrous Metallurgy** 4 hours recitation each week Must be preceded by 102 The fundamental principles of production metallurgy with specific consideration of the methods employed in the reduction and refining of some of the non-ferrous metals.	4	$19.00
TI 1016	**Ferrous Metallurgy** 4 hours recitation each week Must be preceded by 102 The appliances and methods used in the reduction, refining and shaping of ferrous alloys.	4	$19.00
TI 1017	**Electric Furnace Practices** 4 hours recitation each week Must be preceded by 1016 Types of electric furnaces, their construction and uses, and general plant layout.	4	$19.00
TI 1018	**Heat Treatment of Steels** 4 hours recitation each week Must be preceded by 1001 A survey of the fundamentals of the heat treatment of steels.	4	$19.00
TI 1019	**Foundry Metallurgy** 4 hours recitation each week Must be preceded by 101 Comprehensive survey of the metallurgical aspects of foundry operation and control.	4	$19.00
TI 1020	**Interpretation of Steel Specifications** 4 hours recitation each week Must be preceded by 1001 Steel specifications and their use in production and fabrication.	4	$19.00
TI 1101	**Principles of Machines** 4 hours recitation each week Must be preceded by 801 The practical aspects of mechanics with emphasis upon the laws of simple machines, conditions of equilibrium, linear and angular motion, etc.	4	$19.00
TI 1102	**Heat** 4 hours recitation each week Must be preceded by 802, 1101 Elementary principles of heat and their engineering applications.	4	$19.00
TI 1103	**Acoustics** 4 hours recitation each week Must be preceded by 802 Principles of sound production, transmission, and reception; acoustics of industrial buildings.	4	$19.00

Course No.	Course Name	Credit Points	Tuition and Other Fees
TI 1104	**Industrial Radiology** 4 hours recitation each week Must be preceded by 401, 1102 Principles and practices of radiology for foundrymen, metallurgists, designers, architects, inspectors, and others.	4	$19.00
TI 1201	**Psychology and Human Relations** 2 hours recitation each week Fundamentals of psychology of interest to industrial and technical personnel.	2	$10.00 (Non-technical)
TI 1202	**Principles of Industrial Psychology** 2 hours recitation each week Must be preceded by 1201 Applications of psychology to selection of employees, training, etc.	2	$10.00 (Non-technical)
TI 1203	**Urban Sociology** 2 hours recitation each week Analysis of the causes and effects of the expansion of industrial cities.	2	$10.00 (Non-technical)
TI 1204	**Citizenship** 2 hours recitation each week Relationship of the individual to government and society.	2	$10.00 (Non-technical)
TI 1205	**Advanced Industrial Psychology** 2 hours recitation each week Must be preceded by 1202 Continuation of 1202.	2	$10.00 (Non-technical)
TI 1301	**Principles of Measurement** 4 hours recitation each week Instruments and methods of measuring lengths, areas, volume, temperature, time.	4	$19.00
TI 1302	**Industrial Materials** 3 hours recitation each week A survey of materials used in industry with emphasis placed upon the metal-working and machine industries.	3	$15.00
TI 1303	**Industrial Processes** 3 hours recitation each week A survey of industrial processes with emphasis upon those processes employed in the metal-working and machine industries.	3	$15.00
TI 1304	**Flow Meters** 2 hours recitation, 3 hours laboratory each week Must be preceded by 1301 Principles of flow measurement; displacement and area type meters; dismantling, repair, and maintenance of principal types of meters.	4	$19.00 Dep. 5.00
TI 1305	**Principles and Theory of Operation of Combustion Instruments** 3 hours recitation, 3 hours laboratory each week Must be preceded by 102, 401 Instruments for the measurement of draft and pressure; elements of combustion; analysis of the products of combustion, including a study of Orsats and recording instruments.	5	$23.00 Dep. 5.00
TI 1306	**Fundamental Theory of Temperature Measuring Instruments I** 3 hours recitation, 3 hours laboratory each week Must be preceded by 401, 1102 Early methods, glass thermometers, pressure-type thermometers, thermoelectric principles, millivolt meters, and thermocouples.	5	$23.00 Dep. 5.00

Course No.	Course Name	Credit Points	Tuition and Other Fees
TI 1307	**Fundamental Theory of Temperature Measuring Instruments II** 3 hours recitation, 3 hours laboratory each week Must be preceded by 1306 Potentiometers, wheatstone bridge, resistance pyrometry, radiation pyrometry, optical pyrometry.	5	$23.00 Dep. 5.00
TI 1308	**Fundamental Theory of Automatic Control I** 3 hours recitation, 3 hours laboratory each week Must be preceded by 401, 1101 Theory of automatic control, electric control devices, on-off, three position, applications.	5	$23.00 Dep. 5.00
TI 1309	**Fundamental Theory of Automatic Control II** 3 hours recitation, 3 hours laboratory each week Must be preceded by 1308 Pneumatic control, hydraulic control, types and makes of instruments, applications of principles to most common makes.	5	$23.00 Dep. 5.00
TI 1310	**Industrial Materials and Processes** 4 hours recitation each week Applications and characteristics, both physical and chemical, of the materials most commonly used in industry; the mechanical processes by which materials may be shaped or formed.	4	$19.00
TI 1311	**Machineability of Metals** 4 hours recitation each week Metallurgical principles involved in machining operations.	4	$19.00
TI 1312	**Specifications** 2 hours recitation each week Must be preceded by 213, 218, 602 Specification writing for general parts and phases of building construction.	2	$10.00
TI 1313	**Building Materials** 4 hours recitation each week Must be preceded by 101, 219 Materials and items used in building construction.	4	$19.00
TI 1314	**Building Regulations** 4 hours recitation each week Must be preceded by 601 Building codes, ordinances, and regulations, with emphasis on those for state of Indiana.	4	$19.00
TI 1315	**Quantity Survey I** 2 hours recitation, 3 hours laboratory each week Must be preceded by 213, 218 Approximate and detailed methods of estimating volumes of materials needed to erect a building.	4	$18.00
TI 1316	**Quantity Survey II** 2 hours recitation, 3 hours laboratory each week Must be preceded by 1315 Continuation of Quantity Survey I with inclusion of labor cost estimates.	4	$18.00
TI 1317	**Elementary Surveying** 2 hours recitation, 3 hours laboratory each week Must be preceded by 803 Plane surveying by use of 100′ steel tape, engineer's level and transit.	4	$21.00

Course No.	Course Name	Credit Points	Tuition and Other Fees
TI 1318	**General Construction Methods I** 2 hours recitation, 3 hours laboratory each week Must be preceded by 213, 218 Methods used in erection of buildings.	4	$18.00
TI 1319	**General Construction Methods II** 1 hour recitation, 1½ hours laboratory each week Must be preceded by 1318 Further study of problems of building construction.	2	$9.00
TI 1320	**Survey of City Planning** 2 hours recitation, 3 hours laboratory each week Must be preceded by 1317 Community planning problems, such as street planning, zoning, subdivision layout, etc.	4	$18.00

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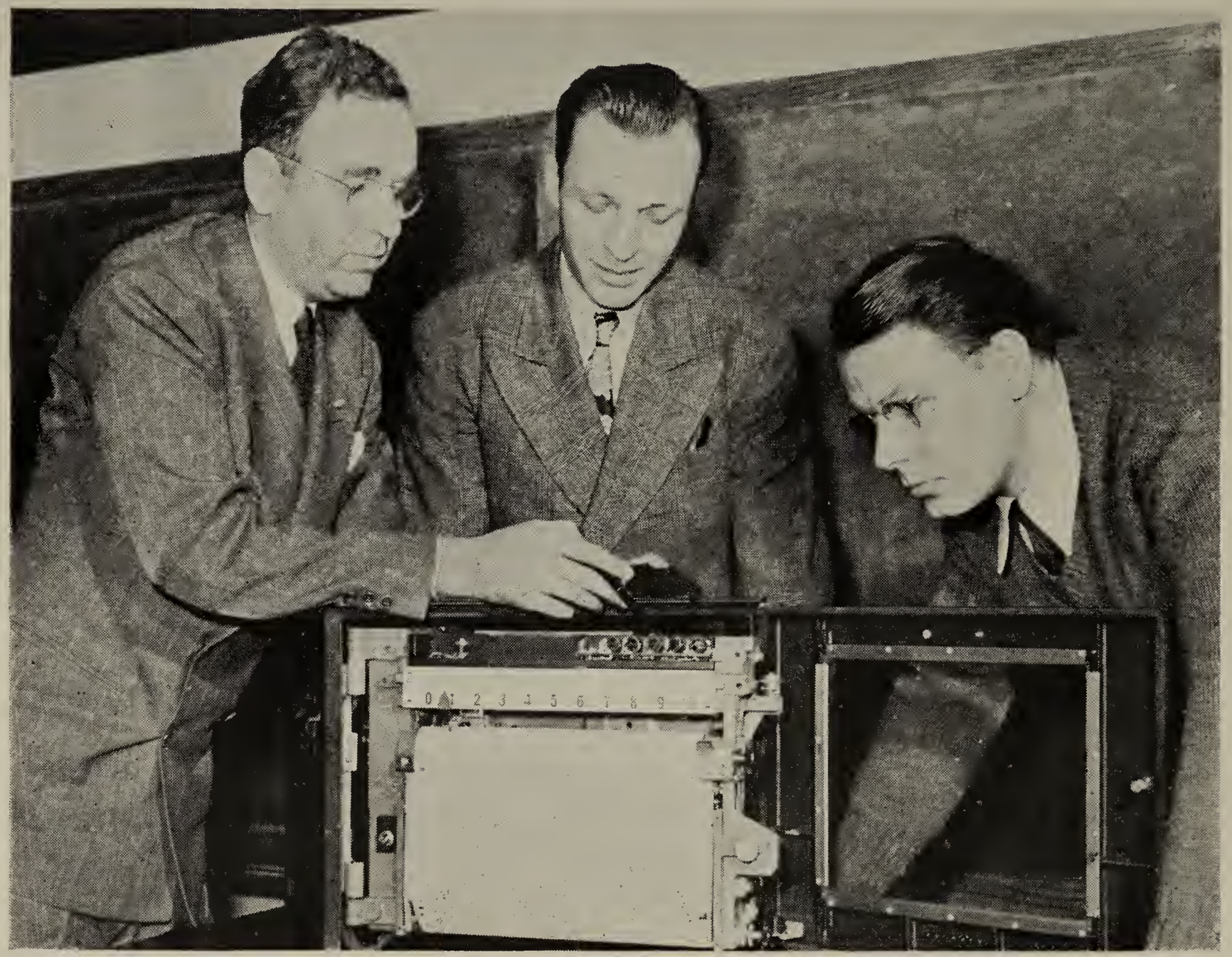

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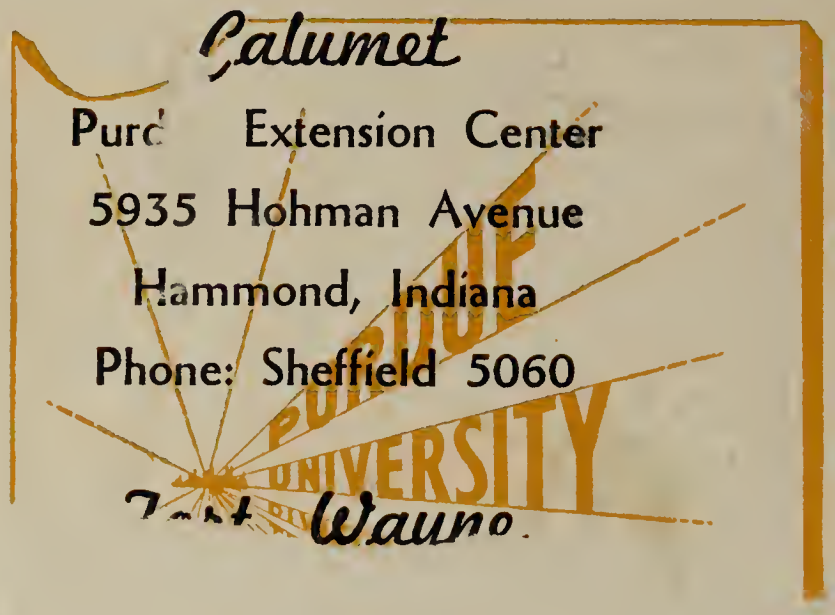

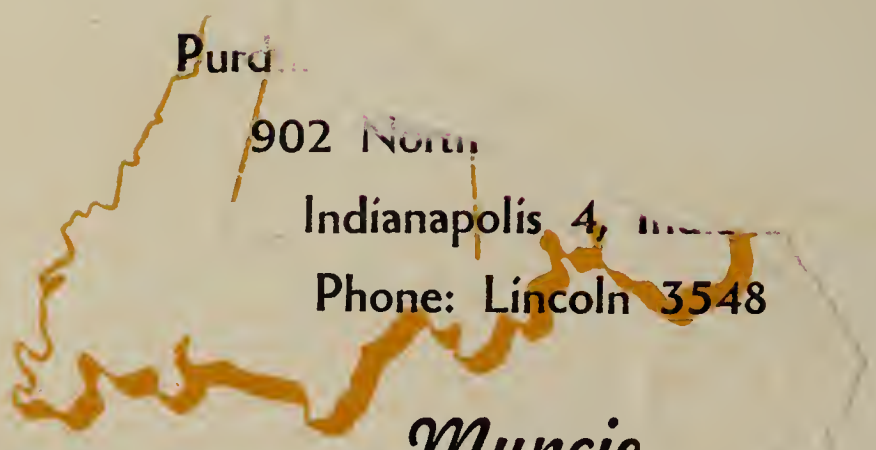

Muncie

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